

52 Trends Shaping Tomorrow's World

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Introduction

For nearly half a century, Forecasting International has been tracking the forces that shape our future. Some 20 years ago, we codified our observations into a list of trends that forms the basis for much of our work. For each of our projects, we compare the specific circumstances of an industry or organization with these general trends and project their interactions. This often allows us to form a remarkably detailed picture of what lies ahead.

Over the years, the number of trends has varied. In this latest edition, we have eliminated a number of trends that had run their course and added four that have risen to prominence. For example, we no longer track the decline of labor unions; they have lost so much of their influence that they are no longer relevant to most subjects we might examine, with the possible exception of the future of unions themselves. Trends we are watching now include the failure of job creation to provide secure lives for Americans who depend on wages for their survival, the growing fragility of our high-tech world, and the spread of cyberwarfare. We also have reorganized the list to clarify the relationships among many of the trends.

We would not attempt to make very long-range forecasts based on these trends. Technological projections become extremely difficult more than two decades into the future, while even demographics lose much of their value beyond about 2050. But for studies in the near and medium term, five to 20 years ahead, we have found this list of trends enormously useful.

Whatever topic interests you, some of these trends will affect it directly. Others will help to form the world in which we live and work. They all are worth paying attention to.



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Economic Trends

1 The economy of the developed world is beginning a new round of growth.

- The Organization for Economic Cooperation and Development (OECD) predicts 1.9% growth among its 30 member nations in 2010 and 2.5% in 2011. The International Monetary Fund (IMF) puts world growth at 4% in 2010 and 4.3% in 2011.

- After six very bad quarters, the U.S. economy finally returned to the black in the third quarter of 2009, growing at an annual rate of 3.5%. In the fourth quarter, it soared to 5.9%. Private consumption, exports, private inventory investment, and residential fixed investment all improved, in addition to increased federal spending. Economists generally predict U.S. growth of 3% in 2010, while OECD forecasts 2.5% in 2010 and 2.8% in 2011. Others put 2010 growth as high as 3.8%, with 2011 coming in at 4.6%.

The limiting factor is unemployment, which reached 10.2% in the United States in October 2009. OECD expects jobless numbers to peak in the first half of 2010. It will take at least five years to bring employment back to its pre-recession level. Until

that is accomplished, unemployment will be a drag on consumer spending and GDP growth.

- China is driving the global recovery. Even in its weakest quarter, Q2 2009, Beijing reported 6.1% GDP growth. For the year, that was up to 8.4%, the strongest for any major economy. The IMF predicts GDP growth in China of 10% in 2010, while the OECD expects 9.3% in 2011.

- The European Union predicts 2010 growth of 0.7% in the euro-denominated economies and 1.5% in 2011. This follows a loss of 4% in 2009. The IMF puts 2010 growth at an anemic 0.3%. In the last quarter of 2009, it came in at just 0.1%.

- Japan's economy grew by 4.8% in Q3 2009, handily beating expectations and officially ending the country's recession. Capital spending, exports, and consumer spending all improved. The Bank of Japan expects growth of 1.2% in 2010, accelerating toward the end of the year.

- India's economy grew by 6.1% in 2009, according to the IMF, which forecasts growth of 7.7% in 2010.

- Inflation remains under control, according to official reports. In January 2010, the United States reported a rise in consumer prices of 2.7% annually. In the Euro area, it stood at -0.9% in December, with the U.K.'s 1.2% inflation the highest among major European economies. Price growth in China and Japan also held in negative numbers.

Assessment and Implications: New growth among all these trading partners should create a "benevolent cycle," in which the health of each partner helps to ensure the continued health of the rest for at least the next several years. If a rising tide lifts all boats, most of the world's countries should be floating high in the years ahead.

The round of growth now beginning should continue at least through 2015.

China has developed into an effective counterbalance for the U.S. economy. When America hits hard times, China can keep the world from following into recession. We first saw this in the post-9/11 crunch in the United States. This should make the global economy much more stable

for so long as China remains a vibrant trading nation.

Any interruptions in economic growth over the next five years should be relatively short-lived. The need to pay down large deficits will restrain economic growth, particularly in the United States, but Forecasting International (FI) sees little prospect that it will drive economies into the second dip of a compound recession or that government spending will trigger uncontrolled inflation.

2 Integration of the global economy continues.

- By some counts, only half of the world's 100 largest economies are nation-states. The rest are multinational corporations. Toyota alone has manufacturing or assembly plants in 22 countries.

- International sales make up nearly half of all revenue for the S&P 500 companies. International revenue growth has outpaced domestic growth since at least 2003.

- International business-to-business (B2B) growth has been especially quick. In 2008, domestic B2B revenues for the S&P 500 gained only 0.4%, while international B2B revenue expanded by 10.8%.

- The European Union's common currency and increasingly uniform product standards continue to make it easier for companies to distribute products and support functions throughout the Continent.

- The Internet continues to bring manufacturers effectively closer to remote suppliers, service firms, and customers.

- Companies are increasingly farming out high-cost, low-payoff secondary functions to suppliers, service firms, and consultants, many of them located in other countries. Parts for the Boeing 787 *Dreamliner* are being constructed in at least eight countries around the world for assembly in the United States.

- Companies in high-wage countries also are outsourcing management, R&D, and service jobs to low-wage countries. For instance, an estimated 40 million American jobs may now be vulnerable to outsourcing.

- Companies in job-receiving countries have begun to establish branches in the donor lands. For example, India's Wipro has branches in Virginia and Ohio, allowing the company both to hire top-quality American programmers and to help tap the lucrative government market.

- Jobs in western Europe are migrating to eastern Europe, the former Soviet Union, and the English- and French-speaking former colonies of Africa. India has begun to ship jobs to even lower-cost countries in Africa.

- India and China are forming a massive economic bloc containing some 40% of the world's population. The number of business flights between them has more than doubled each year since 2006. In 2009, talks began to formalize this de facto arrangement into an official common market.

Assessment and Implications: The global recession of 2008–2009 has dampened free-trade enthusiasm, while problems have discouraged some U.S. companies from outsourcing customer-service functions to Asia. Nonetheless, cost pressures guarantee that companies will continue to ship jobs overseas until pay scales in the developing world rise (or those in the developed world fall) far enough to erode the benefit of doing so.

The growth of e-commerce enables businesses to shop globally for the cheapest raw materials and supplies. In niche markets, the Internet also makes it possible for small companies to compete with giants worldwide with relatively little investment.

This has increased the risk of quality-control problems and fraudulent cost-cutting by suppliers, as seen in the recent spate of tainted food and other products coming from China.

The Internet also has created a generation of "e-preneurs" whose businesses exist largely on the Internet, with production, fulfillment, and other functions all outsourced to specialty firms.

Demand will continue to grow for employee incentives suited to other cultures, aid to executives going overseas, and the many other aspects of doing business in foreign coun-

tries. However, rising demand for foreign-language training is likely to be a temporary phenomenon, as more countries adopt English as part of their basic school curricula.

Western companies may have to accept that proprietary information will be shared not just with their immediate partners in Asian joint ventures, but also with other members of the partners' trading conglomerates. In high technology and aerospace, this may expose companies to extra scrutiny due to national-security concerns. Establishing overseas branches mitigates this concern by keeping trade secrets within the company, even while gaining the benefits of cheaper foreign labor and other resources.

Economic ties can give richer, more powerful countries considerable influence over their junior partners. Thus far, China has been the most successful at wielding this "soft" power. This has given it the ability to undermine U.S. foreign policy even as it secures its energy and raw-materials needs. Establishment of an Asian common market could make China, India, and their partners the effective center of the global economy.

3 Consumerism is still growing.

- A networked society is a consumerist society. Shoppers increasingly have access to information about pricing, services, delivery time, and customer reviews on the Internet. Marketers, of course, can also check the competition's offerings and shift competition from price to improvements in service and salesmanship.

- Children in the United States become shoppers as young as age six and become aware of brands at age two or three, due largely to child-focused advertising.

- The millennial generation is becoming increasingly prone to compulsive spending. In the United States, 10% of millennials can be classified as clinically compulsive spenders, compared with 5% of Gen Xers and perhaps 3% of baby boomers. However, the shock of the recent recession may have mitigated this

problem. It will be several years before enough data are available to answer this open question.

Assessment and Implications: Consumer advocacy agencies and organizations will continue to proliferate, promoting improved content labels, warning notices, nutrition data, and the like on packaging, TV, the Internet, and even restaurant menus.

Europe, Japan, China, and other markets are undergoing the same revolution that has replaced America's neighborhood stores with cost-cutting warehouse operations, discounters such as Walmart, and "category killers" like Staples and Home Depot.

However, the cultural and political power of farmers and small shop owners has slowed this trend in some areas, particularly in Japan.

In response to the recent contamination of food imported from China, the U.S. Food and Drug Administration will be required to improve screening of incoming food products. However, it will not receive adequate funding to do the job effectively.

As prices fall to commodity levels and online stores can list virtually every product and brand in their inventory without significant overhead, service is the only field left in which marketers on and off the Internet can compete effectively.

Branded items with good reputations are even more important for developing repeat business.

4 Research and development play an expanding role in the world economy.

- R&D spending by the world's 1,000 largest companies has been expanding at a compound annual growth rate of 7.1% for the last five years, according to an annual survey by Booz & Company. Spending varied widely by sector. Worldwide, more than 60% of auto companies in the study cut their R&D programs, while 80% of Internet and software firms raised theirs.

- Total U.S. outlays on R&D have grown steadily for the past three decades. In 2008, the top 531 R&D firms in the United States spent \$221 billion on R&D, or an average of 4.5%

of revenues. Corporate R&D in the United States has shifted in recent years, with less emphasis on pharmaceuticals and computer-related fields and more focus on biotechnology, nanotechnology, and security technologies.

- China has taken second place in the world's R&D spending, with a budget estimated at \$136 billion in 2006, up from \$60 billion in 2001. Still more spending may be hidden in military budgets. China says it will raise its R&D spending from about 1.23% of GDP in 2004 to 2.5% in 2020. In 2008, it spent 40% more on R&D than the year before. China's output of research papers increased from just over 20,000 in 1998 to nearly 112,000 in 2008. It passed Japan, Germany, and the United Kingdom in 2006. A study by the European Union predicts that China and India will lead the world in R&D by 2025.

- R&D outlays in Japan have risen almost continuously, to nearly 3.5% of GDP. In 2007, Japan spent about \$148 billion on R&D. In 2008, its R&D spending grew by 4.4%.

- R&D spending by the top 350 companies in the European Union amounted to \$170 billion in 2008, up 8.1% in a year.

- In Russia, government R&D funding amounted to about \$53 billion in 2008, approximately 60% of total research funding in the country. Some 44% of Russia's R&D budget goes to defense research, 10% to space. These figures omit whatever clandestine military research escapes notice. Owing to the global recession, however, Russia's research budget faced planned cuts of 30% in 2009.

- Western corporations are outsourcing a growing fraction of their R&D to foreign contractors, just as they do other functions. Much of this work goes to India, some to Russia and eastern Europe, but the growth area is China.

Assessment and Implications: This is a significant factor in the acceleration of technological change.

The demand for scientists, engineers, and technicians will continue to grow, particularly in fields where research promises an immediate business payoff.

Low-wage countries such as China

once took only low-wage jobs from advanced industrialized countries. Today, higher-paid jobs in science, technology, and the professions also are at risk.

Countries like India, China, and Russia once suffered a brain drain as those with high-tech skills emigrated to high-demand, high-wage destinations. Today, many students and professionals spend time in the West to learn cutting-edge skills, and then return to their native lands to work, start companies, and teach. This promotes the growth of some developing countries while reducing the competitive advantages of the developed world.

5 Services are growing faster than any other sector of the global economy.

- Service jobs have replaced many of the well-paid positions lost in manufacturing, transportation, and agriculture. These new jobs, often part time, pay half the wages of manufacturing jobs. On the other hand, computer-related service jobs pay much more than the minimum for workers with sound education and training. Medicine, the law, and many other well-paid occupations also fall into the service sector.

- Service industries provide more than 79% of the GDP in the United States, 77% in France, 74% in Britain, 73% in Japan, and 70% in Germany. In each case, services are growing rapidly; other sectors, less so.

- Service industries account for about 77% of private nonfarm employment in the United States, up from 70% in 1990. Services accounted for the entire net gain in U.S. private employment in the decade ending 2010.

- In Britain, services provide 80.4% of jobs; in France, 72%; in Japan, 68%; in Germany, 64%. In each case, the percentage of service employment is rising.

- In contrast, services in China provide only 40.5% of GDP and 33% of employment. In India, they account for 63% of GDP and perhaps 35% of jobs. (Sector employment data for India are extremely dated.)

- In the decade ending in 2016, service industries will provide 15.7

million new jobs, according to the U.S. Bureau of Labor Statistics (BLS).

- Education and health services will add 5.5 million jobs, more than 30% of all new jobs expected for the period. Employment in professional, scientific, and technical services will grow by 28.8% and add 2.1 million new jobs by 2016.

- Production and less-skilled jobs, in contrast, are disappearing. By 2014, the United States is expected to have more chief executives than machine tool operators, more lawyers than farm workers.

- Meeting the BLS estimate of 15.7 million new jobs by 2016 would require the creation of some 300,000 jobs every month from November 2009 on. This assumes that it is necessary to make up the 8.4 million jobs that the official numbers say have been lost since the recession began. It omits 10 million or more people who either have given up looking for work or have settled for part-time employment.

Assessment and Implications: This trend is helping to deplete the middle class, as well-paid jobs in manufacturing are replaced by ill-paid service positions, leaving a country of "have lots" and "have nots," but relatively few "have enoughts."

Services are now beginning to compete globally, just as manufacturing industries have done over the last 20 years. By creating competitive pressure on wages in the industrialized lands, this trend will help to keep inflation in check.

The growth of international business will act as a stabilizing force in world affairs, as most countries find that conflict is unacceptably hard on the bottom line.

6 Job creation is ceasing to provide employment for all who need it.

- According to official estimates, it takes 100,000 jobs per month to absorb young people and others just entering the labor force. Between January 1999 and October 2009, the U.S. economy generated an average of only 26,000 jobs per month.

- Most economists believe it will take five years—that is, to 2015—just

to replace the 8.4 million jobs lost to date in the post-2007 recession.

- Of the workers who lost middle-class or better jobs during the 2001–2002 recession, an estimated two-thirds were forced to accept positions that paid much less well and often required a radical loss of lifestyle.

- In Europe, job losses are expected to top 20 million before the recession ends in 2010.

- The economic turmoil of recent years is only partly responsible for this trend. It has accelerated the continuing replacement of human labor by computers and automation. In the United States, worker productivity rose by 6.9% (annualized) in the second quarter of 2009, 9.5% in the third, and 6.4% in the fourth. For more than a decade, most productivity gains have come in industries that have been reworking business processes to incorporate computers and automation.

- In Europe, where companies have been slower to adopt computerized work methods, productivity gains have been just over half as quick as in the United States.

- The other side of growing productivity is a declining need for human workers. If you raise productivity by 2.5%, you need 2.5% fewer workers to deliver the same amount of goods or services. Employment growth slows. And when productiv-

ity grows faster than the market, employment declines.

- As computers become more powerful, they can take over more jobs that now require human input. Within 10 years, they will be capable of carrying out almost any task that does not need actual human hands. Manufacturing already is all but lost to human labor. Service, management, and even many research jobs are next. Human workers will be employable only in jobs that cater to the wealthy, who enjoy the exclusivity of being waited on, and where they can get the job done even more cheaply than computers and automated machinery.

Assessment and Implications: This trend is inevitable. The United States and other developed lands will become essentially jobless societies within the lifetimes of today's younger adults. Other lands will follow as they become able to afford the necessary technology. The only questions left are of timing.

One of the most important functions of a society is to distribute wealth so that the majority of people have at least the opportunity to provide a secure life for themselves and their families. The jobs-for-wages model adopted during the Industrial Revolution is losing the ability to fulfill this mission.

Within 10 years, the United States

will begin to follow Europe's lead, reducing the workweek so that jobs and income can be divided among more people.

The developed world faces a more severe decline in living standards than many people recognize. Eventually, it will be necessary to scrap the current system in favor of some other means of fairly distributing society's wealth. Developing that system may be the most pressing unrecognized necessity now facing the United States and its peers.

Population Trends

7 The world's population is growing rapidly, though not as fast as it once did.

- Expect 9.2 billion people to feed by 2050.

- Average annual growth worldwide peaked at 2.19% in 1963 and has fallen steadily since. The U.S. Census Bureau's International Data Base projects that annual growth will fall below 1% in 2016 and below 0.5% by 2047.

- The greatest fertility is found in those countries least able to support their existing populations. Countries with the largest population increases between 2000 and 2050 include Palestinian Territory (217%), Niger

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(205%), Yemen (168%), Angola (162%), the Democratic Republic of Congo (161%), and Uganda (133%). The Muslim world is especially fertile, with fertility rates of 7.5 in Afghanistan, 6.0 in Yemen, and 4.9 in Iraq. Of the 2.7 billion extra people in the world in 2050, about 40% will live in sub-Saharan Africa and 30% in the Muslim world.

- In contrast to the developing world, many industrialized countries will see fertility rates below the replacement level and hence significant declines in populations, excluding the effects of immigration. This means that developed nations' share of world population will fall from 14% in 2000 to only 10% in 2050.

- By 2015, the workforce in Japan and much of Europe will be shrinking by 1% per year. By the 2030s, it will contract by 1.5% annually.

Assessment and Implications: Even these estimates may be much too low. According to the Center for Strategic and International Studies (CSIS), most official projections underestimate both fertility and future gains in longevity. They also assume that life expectancy will grow more slowly in the future, which seems unlikely.

Rapid population growth in the United States compared with its industrialized competitors will reinforce American domination of the global economy, as the European Union falls to third place behind the United States and China.

To meet human nutritional needs over the next 40 years, global agriculture will have to supply as much food as it has produced during all of human history.

Unless fertility in the developed lands climbs dramatically, either would-be retirees will have to remain on the job or the industrialized nations will have to encourage even more immigration from the developing world. The third alternative is a sharp economic contraction and lower living standards. A fourth is the widespread automation of service jobs as well as manufacturing to accomplish the work needed to support accustomed living standards. We expect to see a combination of all four approaches.

Barring enactment of strict immi-

gration controls, rapid migration will continue from the Southern Hemisphere to the North, and especially from former colonies to Europe. A growing percentage of job applicants in the United States and Europe will be recent immigrants from developing countries.

8 People living in the developed world are living longer.

- Each generation lives longer and remains healthier than the last. Since the beginning of the twentieth century, every generation in the United States has lived three years longer than the previous one. An 80-year-old in 1950 could expect 6.5 more years of life; today's 80-year-olds are likely to survive 8.5 more years. Life expectancy in Australia, Japan, and Switzerland is now over 75 years for males and over 80 for females.

- The development of new pharmaceuticals and medical technologies is making it possible to prevent or cure diseases that would have been fatal to earlier generations. In many developed countries, credit also goes to government health programs, which have made these treatments available to many or all residents. In the developing lands, a primary cause is the availability of generic drugs, which cut the cost of care and make health affordable even for the poor.

Assessment and Implications: Medical advances that slow the fundamental process of aging now seem to be within reach. (This is a controversial issue within the medical community, but the evidence appears strong.) Such treatments could well help today's middle-aged baby boomers to live far longer than even CSIS anticipates. In the developed world, younger generations are likely to live routinely beyond the century mark.

Global demand for products and services aimed at the elderly will grow quickly in the immediate future, but this trend may pass as geriatric medicine improves the health of the elderly.

Developed countries may face social instability as a result of competition for resources between retirement-age boomers and their

working-age children and grandchildren. At the present rate of growth, public spending on retirement benefits in the United States and other developed countries could be one-fourth of GDP by 2050, even as the number of workers available to support each retiree declines sharply.

Any practical extension of the human life span almost surely will prolong health as well and will reduce the incidence of late-life disorders such as cancer, heart disease, arthritis, and possibly Alzheimer's disease. This would dramatically reduce demand for products and services in the senior market, at least in the developed world. FI believes this development is nearer than even many researchers expect.

Healthier aging in the developed world may offer new hope to the world's poorer, sicker lands. Faced with declining growth in their pharmaceutical industries, Western nations—and particularly the United States—are likely to subsidize research and treatment for diseases that burden the poor countries of Africa and Asia. This will give those lands their first real prospects for economic growth and improved quality of life.

9 The world's elderly population is growing dramatically.

- Worldwide, the elderly (age 65 and older) numbered 440 million and represented 6% of the global population in 2002. Their numbers will nearly double by 2020 (to more than 9% of total population) and more than triple by 2050 (to nearly 17%), according to the U.S. Census Bureau's International Data Base.

- In the developed world, people age 60 and older made up one-fifth of the population in 2000 and will grow to one-third in the next half century.

- Between 2000 and 2050, the 60+ age group in the less-developed countries will grow from only one in twelve to one in five.

- The first baby boomers turn 65 in 2011. Thereafter, 10,000 Americans will turn 65 every day. Only half will maintain their standard of living in retirement. One in four will be dependent on government programs.

- Throughout the developed world, population growth is fastest among the elderly. In the United States, there are 4.2 million people age 85 and up. By 2050, there will be 19.3 million.

- In Europe, the United States, and Japan, the aged also form the wealthiest segment of society.

- In the United States, at least, suburban populations are aging faster than those in the cities.

Assessment and Implications: Not counting immigration, the ratio of working-age people to retirees needing their support will drop dramatically in the United States, Germany, Italy, Russia, Japan, and other countries. This represents a burden on national economies that will be difficult to sustain under current medical and social-security systems.

In the next two to three decades, barring dramatic advances in geriatric medicine, shortages of health workers will loom large in “aging vulnerable” countries. The United States in particular will need at least twice as many physicians specializing in geriatrics as its current 9,000, as well as half a million more nurses by 2020.

Suburban communities are likely to face a growing demand for social services such as senior day care, public transportation, and other programs for the elderly. This will place a growing strain on local government budgets.

In the developing countries, where the elderly have traditionally relied on their children for support, this system will begin to break down as middle-aged “children” find themselves still supporting their parents while anticipating their own retirement.

10 Mass migration is redistributing the world's population.

- The International Organization for Migration estimates that there were some 214 million international migrants in the world as of 2008, including 20 to 30 million unauthorized migrants. About 70 million migrants live in Europe, 61 million in Asia, 50 million in North America, and 20 million in Africa.

- There are nearly 100 million in-

ternational migrant workers in the world, according to the United Nations. About one-third live in Europe, with slightly fewer in Asia and North America. (These figures include only the workers themselves, not their dependents.)

- Immigration to western Europe from eastern Europe, North Africa, the Middle East, and the Indian subcontinent continues despite controls enacted in the wake of terrorist attacks. Between 3 million and 4 million more migrants are expected to reach Europe in the next 25 years. A November 2009 survey by Ipsos MORI found that one-third of Britons considered race relations and immigration among the most important issues facing the U.K., up nine percentage points from the previous month.

- In China, about 160 million people have moved from rural areas to cities in recent years.

- Immigration is quickly changing the ethnic composition of the U.S. population. In 2000, Latinos made up 12.6% of the U.S. population; by 2050, they will account for 24.5%. Asians in the United States, currently 3.8% of the population, will comprise 8% by 2050, according to the latest U.S. Census Bureau figures.

- Higher fertility rates among the immigrant Latino population will accelerate this trend. As of 2002, women in the United States produced about two children during their lives, just enough to maintain the population. Among Hispanics, the average was more than 2.7 births per woman. Among Mexican immigrants, it was nearly 2.9.

- At the same time, there is a small countertrend of Gen Xers and, especially, millennials moving to other countries to pursue business opportunities or for cultural interest.

Assessment and Implications: Migration will accelerate in the years ahead as native workforces shrink in most developed lands.

Impoverished migrants will place a growing strain on social-security systems in the industrialized countries of Europe and North America. Similar problems will continue to afflict the urban infrastructures of China and India.

Remittances from migrants to their

native lands are helping to relieve poverty in many developing countries. Globally, these payments exceeded \$230 billion in 2005, according to the World Bank.

Significant backlashes against foreign migrants, such as the skinhead movement in Europe, will be seen more frequently in the years ahead, even in the most peaceful lands. For example, in Scandinavia, resentment against foreign workers is strong, in part because they can return to their native lands after three years of employment and collect a pension equal to the minimum wage for the rest of their lives.

Since the terrorist attacks of September 11, 2001, and the rail bombings in London and Madrid, the large number of Muslim immigrants in Britain, France, and other European lands has inspired suspicion and some persecution.

Unfortunately, suspicion is to some extent justified. A tiny minority of Muslim immigrants have proved to be linked to terrorist groups, and some have plotted or carried out terrorist attacks. So have native-born Muslims and converts to Islam.

Societal Trends

11 Values are changing rapidly.

- Witness a February 2010 poll showing that 70% of Americans believe the United States should repeal the “don’t ask, don’t tell” policy that allows gay men and lesbians to serve in the military only if they hide their sexual orientation, while nearly 60% believe they should be allowed to “serve openly.”

- Industrialization raises educational levels, changes attitudes toward authority, reduces fertility, alters gender roles, and encourages broader political participation. This process is just beginning throughout the developing world. Witness the growing literacy, declining fertility, and broad voter turnout seen in India over the last decade.

- Developed societies increasingly take their cue from mid-life Gen Xers and the millennial generation, rather than from the baby boomers who



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dominated the industrialized world's thinking for most of four decades.

- Millennials value, and display, both self-reliance and cooperation. They need self-reliance because they believe individuals can no longer count on government social-security income, pensions, or other benefits. They value (and are good at) cooperation because they recognize that group action often is the best way to optimize the use of scarce resources.

- Post-9/11 fear of terrorist attacks has led Americans to accept almost without comment security measures that their traditional love of privacy once would have made intolerable. This continues a long-established tendency in the United States to prefer a greater sense of safety at the cost of increased government surveillance and intervention in their lives.

Assessment and Implications: The growing influence of the post-baby-boom generations ensures that this trend will continue.

The highly polarized political environment that has plagued the United States since the 1980s will slowly moderate as results-oriented Gen Xers and millennials begin to dominate the national dialogue.

As national security concerns have lost their immediacy, family issues are beginning to regain their significance in American society: long-term health care, day care, early childhood education, antidrug campaigns, and the environment.

Reaction against changing values is one of the prime motives for cultural extremism, not only in the Muslim world and in parts of India, but also in the United States and Europe, where it appears in the form of hate crimes against immigrants.

The spread of Westernized values in the developing world will provoke an even greater reaction from fundamentalists elsewhere. The devout of the Middle East and parts of Africa and Asia see this trend as cultural imperialism by America and Europe, whose secularity threatens the piety of their children. This is likely to make the anti-West movement among Muslims even more violent and widespread.

12 Privacy, once a defining right for Americans, is dying quickly.

- Internet communications, a basic part of life for many people, are

nearly impossible to protect against interception, and governments around the world are working to ensure their unfettered access to them. Postings to blogs and Web forums are nearly immortal. The contents of most Internet-connected computers are open to virtually unobstructed snooping by anyone with a minimum of skill and the will to examine them. All but the most secure can be invaded by more capable hackers.

Despite this, many individuals and companies are moving at least part of their personal and work-related data and computing to "the cloud"—online systems that can be accessed from any computer, but may not offer much real security.

- Corporate databases are collecting and marketing data on individual credit-worthiness, incomes, spending patterns, brand choices, medical conditions, and lifestyles. While privacy regulations bar distribution of much personal information in the European Union, restrictions in the United States are much weaker.

- Widespread surveillance of private individuals is technically feasible and economically viable, as tiny, powerful cameras now cost next to

nothing. Increased surveillance has become socially acceptable in an age when many people fear terrorism and crime. In the United States, the growth of surveillance also is driven by the fear that lawsuits following a future terrorist attack could claim that failure to install monitoring equipment constitutes negligence.

Assessment and Implications: In the future, privacy is likely to be defined, not by the ability to keep information truly secret, but by the legal power to restrict its distribution. Even this limited form of privacy will be eroded as both government and private organizations find legal justification for their interest in personal information. Once access is granted to any type of information, it is unlikely ever to be rescinded.

In large and medium-sized cities around the world, spaces that remain unwatched by video cameras will continue to shrink.

Growing numbers of companies, and even private citizens, will encrypt their computer data.

The number of criminal cases based on surveillance will grow rapidly in countries with the required technological sophistication and infrastructure.

Private citizens increasingly will use similar technologies to watch over government abuse, as in cases where bystanders have recorded police misconduct with their cell-phone cameras.

13 The physical-culture and personal-health movements will remain strong, but far from universal.

- Emphasis on preventive medicine continues to grow. Of late, a few insurance carriers—but more each year—have expanded coverage or reduced premiums for policyholders with healthy lifestyles.

- Legislation has sometimes mandated change. Since 2005, for instance, 49 out of 50 U.S. states have required insurers to pay for mammograms.

- Health is continuing to improve in the United States, but less quickly. During the 1990s, health in the United States improved by 1.5% annually, based on such measures as

smoking prevalence, health-insurance coverage, infant mortality rates, and premature deaths. During the 2000s, health improvement has slowed to just 0.2% a year.

- Health consciousness is spreading to Europe. For example, a recent poll found that two-thirds of Britons now spend more to maintain a healthy lifestyle than they did a decade ago, and three out of four say they enjoy leading a healthy lifestyle. Unfortunately, much of the developing world still worries more about eating enough than about eating healthy.

- Smoking is in general decline in the United States. Fewer than 20% of American adults smoked cigarettes as of 2007, down from 24.7% in 1997, according to the Centers for Disease Control. This is still far from the CDC's Healthy People 2010 Goal of 12%. About 42.5% of current smokers reported that they had tried to stop smoking within the last year.

- The antismoking movement also has made its way to Europe. Ireland banned smoking from its pubs late in April 2004. In 2006, France banned smoking in public facilities. Britain followed suit in 2007.

- The global obesity crisis is a significant countertrend to the physical-culture movement. Poor diet, physical inactivity, and associated obesity contribute to 47% of diseases and 60% of deaths worldwide. Developing countries that “Westernize” their diets by consuming more foods high in fat, sugar, and salt are at risk of epidemic obesity, including among children and adolescents.

- The current epidemic of obesity in the United States is especially troubling. The number of children who are overweight has tripled since 1980, to about 18% for those age six or older. However, there is some evidence that obesity has begun to stabilize among American adults. The rate of obesity among women appears to have reached a plateau in the last six years.

Assessment and Implications: Continuing health improvements in the industrialized world will be accompanied by a dramatic rise in heart disease, diabetes, cancer, and other such “lifestyle” disorders in the developing lands.

As the nutrition and wellness movements spread, they will further improve the health of the elderly. Better health in later life will make us still more conscious of our appearance and physical condition. Thus, health clubs will continue to boom, and some will specialize in the needs of older fitness buffs. Diet, fitness, stress control, and wellness programs will prosper.

By 2015, Congress will add coverage of many preventive-care activities to Medicare benefits.

The cost of health care for American baby boomers and their children could be much lower in later life than is now believed. However, Asia faces an epidemic of cancer, heart disease, emphysema, and other chronic and fatal illnesses related to health habits.

Like tobacco companies, producers of snack foods, liquor, and other unhealthy products will increasingly target markets in developing countries where this trend has yet to be felt.

Chronic diseases related to obesity burden national economies and could thwart economic progress in developing countries.

14 Time is becoming the world's most precious commodity.

- In the United States, workers spend about 10% more time on the job than they did a decade ago. European executives and nonunionized workers face the same trend.

- Computers, electronic communications, the Internet, and other technologies are making national and international economies much more competitive.

- In this high-pressure environment, single workers and two-income couples are increasingly desperate for any product that offers to simplify their lives or grant them a taste of luxury—and they can afford to buy it.

- China's rapid economic development means its workers also are experiencing faster-paced and time-pressured lives. In a recent survey by the Chinese news portal Sina.com, 56% of respondents said they felt short of time.

- Technical workers and execu-

tives in India are beginning to report the same job-related stresses, particularly when they work on U.S. and European schedules.

Assessment and Implications: Time pressures are likely to grow as changing technologies add the need for lifelong study to the many commitments that compete for the average worker's time.

Stress-related problems affecting employee morale and wellness will continue to grow. Companies must help employees balance their time at work with their family lives and need for leisure. This may reduce short-term profits but will aid profitability in the long run.

As time for shopping continues to evaporate, Internet and mail-order marketers will have a growing advantage over traditional stores.

Some 64% of Chinese workers surveyed said they were never late to work and were intolerant of other people's tardiness. This trend suggests a new cultural challenge to the traditional Chinese belief in a leisurely existence.

China, India, and other developing countries can expect consumer trends similar to those in the United States as workers seek out convenience foods, household help, and minor luxuries to compensate for their lack of leisure time.

15 Despite some xenophobic reactions to immigrants, there is growing acceptance of diversity.

- Migration is mixing disparate peoples and forcing them to find ways to coexist peacefully and productively.

- The Internet and other technologies promote long-distance communication and build links between distant and disparate people.

- Mass media—including television, radio, films, interactive games, and music—tend to homogenize global culture as they promote a common language, mores, and cultural reference points.

- In the United States, for instance, television encourages the spread of standard accents and language patterns.

- The globalization of business is having a similar impact. Throughout

the United States and Europe, regional differences, attitudes, incomes, and lifestyles are blurring as business carries people from one area to another.

- Intermarriage also continues to mix cultures geographically, ethnically, socially, and economically.

- Minorities are beginning to exert more influence over national agendas.

- The growing number of African Americans, Hispanics, and Asians in the United States is mirrored by the expanding population of refugees and former "guest workers" throughout Europe.

- Britons increasingly support staying in the European Union, according to a September 2007 survey by the polling firm Ipsos MORI. In March 2001, 39% of those surveyed said they would vote to keep the U.K. in the European Union, and 42% favored getting out. By 2007, 51% supported staying in while 39% wanted out.

- However, in many countries there are powerful reactions against these changes. The growth of the German neo-Nazi movement after unification in 1992 is one obvious example, though public distaste for these views has tended to keep extremist activities in check.

- American hostility toward undocumented aliens also may be viewed as a reaction against the growing political and cultural influence of a minority.

Assessment and Implications: The interaction of diverse cultures will continue to grow, both internationally and intranationally, throughout much of the world.

Groups with highly varied customs, languages, and histories of necessity will develop ways to coexist peacefully. Nonetheless, local conflicts will continue to erupt in societies where xenophobia is common.

Companies will hire ever more minority workers and will be expected to adapt to their values and needs. Much of the burden of accommodating foreign-born residents will continue to fall on employers, who must make room for their languages and cultures in the workplace.

Public schools and libraries must find more effective ways to educate

this future workforce.

16 Tourism, vacationing, and travel (especially international) will continue to grow in the next decade and beyond.

- International tourism grew by more than 6% in the first half of 2007, thanks in part to global prosperity. The recession-induced slowdown is only temporary; travel will recover as the world economy does. By 2020, international tourist arrivals are expected to reach 1.6 billion annually, up from 842 million in 2006.

- The number of Americans traveling to foreign countries (excluding Canada and Mexico) crashed following the September 11 attacks. More recently, their numbers have been growing by about 5.5% annually, even faster than before 2001.

- International arrivals in the United States recovered dramatically after the post-9/11 period, to a record 58 million in 2008. After a forecast decline in 2009, thanks to the recession, international tourism to the United States is expected to rebound by 3% in 2010 and by 5% annually thereafter through 2013.

- U.S. domestic tourism is growing about 2.3% each year.

- By 2020, according to the World Trade Organization, 100 million Chinese will fan out across the globe, replacing Americans, Japanese, and Germans as the world's most numerous travelers. Some 50 million Indian tourists will join them. By 2020, China can expect 130 million international arrivals.

- Online travel services are displacing traditional travel agencies in all but cruises and other luxury markets. Online leisure, unmanaged business, and managed business travel spending will increase from \$117 billion in 2009 and reach \$158 billion by 2013.

- Multiple, shorter vacations spread throughout the year continue to replace the traditional two-week vacation.

Assessment and Implications: Once the recession passes, travel will grow by at least 5% per year for the foreseeable future.

Tourism offers growing opportunities for out-of-the-way destinations

that have not yet cashed in on the boom. This will make it an important industry for still more developing countries.

American domestic tourism will continue to grow by an average of 2.3% per year through at least 2011.

The tourism industry will create 3.3 million new jobs worldwide over the next seven years. Jobs dependent on tourism will comprise nearly 14% of the global workforce.

This will bring major opportunities for the travel industries of Southeast Asia and Africa, where Chinese and Indian tourists can take quick, inexpensive vacations.

Retirees who travel off-season will further ease the cyclical peaks and valleys typical of the industry.

Cruise ships will continue to lure retirees. Some liners are offering full-time residency—creating new options for assisted living arrangements.

17 Education and training are expanding throughout society.

- Rapid changes in the job market and work-related technologies will require increased training for almost every worker.

- Knowledge turnover in the professions is a growing challenge that will require continuous retraining and lifelong learning. A substantial portion of the labor force will be in job retraining programs at any moment. Much of this will be carried out by current employers, who have come to view employee training as a good investment.

- Of roughly 240 job categories classified by the U.S. Bureau of Labor Statistics (BLS) to experience high growth, 86 require a college degree, while 70 more require at least some college education. All the rest call for work experience in a related field, on-the-job training (often for long periods), or a postsecondary vocational degree.

- We already are seeing a trend toward more adult education. One reason is the need to train for new careers as old ones are displaced or boomers grow bored with them. The other is the need of healthy, energetic people to keep active during retirement.

- Nearly half of Americans ages 25 and older—92 million people—take part in some form of continuing education.

- In the United States, education is moving rapidly to the Internet, as small, rural grammar and high schools supplement their curricula with material from larger institutions, while universities increasingly market their programs to distant students.

- In order to give those who cannot attend their classes a chance to educate themselves, the Massachusetts Institute of Technology, in 2002, put its entire curriculum on the Internet, including class notes, many texts, and sometimes videos of classroom lectures. Other institutions are following suit.

- In Mexico, the entire curriculum for 10- and 11-year-olds has been digitized. Some 5 million students now receive all their instruction via the Enciclomedia, a computer system that projects any of 20,000 images, videos, and even commercial movie clips onto an electronic screen. Teachers act largely as managers for the teaching system. The goal is to improve educational quality, and teachers report that children pay closer attention and learn more than in traditional classrooms. Delegations from India, China, and even the United States have visited Mexico to evaluate the Enciclomedia for possible use at home.

- U.S. public schools face an extreme teacher shortage. Some 40% of teachers say they will leave the profession within five years. American schools will add 93,000 new teaching positions between 2004 and 2014, according to BLS. However, the need to replace teachers leaving the profession will mean that 169,000 job openings for teachers must be filled each year.

Assessment and Implications: This is another trend at the beginning of its life. Over the next two decades, it is likely to transform working lives and educational systems around the world.

In order to keep up with growing demands for education, schools will train both children and adults around the clock.

The academic day will stretch to

seven hours for children so as to enable students to compete with their peers in other countries, who already devote much more of their time to learning, with predictable results.

Adults will use much of their remaining free time to prepare for their next job.

In knowledge-based economies, a region's growth prospects depend on its ability to generate and use innovation. This correlates roughly with the number of college-educated adults living there. Throughout the industrialized countries, this gives cities an advantage over rural and suburban areas. It is one reason upwardly mobile adults tend to move to the cities.

Skills are the most important factor in economic success today. Unfortunately, the people who need skills most—the poor and unemployed—cannot afford schooling.

As the digital divide is erased and minority and low-income households buy computers and log onto the Internet, groups now disadvantaged will be increasingly able to educate and train themselves for high-tech careers.

Even the smallest businesses must learn to see employee training as an investment rather than an expense. Motorola estimates that it reaps \$30 in profits for each dollar it spends on training.

Both management and employees must get used to the idea of lifelong learning. It will become a significant part of work life at all levels.

18 Advanced communications technologies are changing the way we work and live.

- Telecommuting is growing rapidly, thanks largely to texting, social networking, e-mail, and other tech-enabled forms of communication. About 80% of companies worldwide now have employees who work at home, up from 54% in 2003. The number of telecommuters in the United States reached an estimated 20 million in 2006. The total who telecommuted at least one day per month reached nearly 35 million by 2008, according to BLS.

- AT&T says that 90% of its employees do some work away from

the office, while 41% work at home one or two days per week. This saves the company a reported \$180 million a year.

- The Census Bureau reports that 11 million Americans were working out of their homes in 2005, the latest data available.

- Millennials already have abandoned e-mail for most purposes other than communicating with “clueless” parents and grandparents. Most have adopted instant messaging and social-network Web sites to communicate with their peers. One older-generation publisher of our acquaintance was shocked when a millennial ad buyer refused to accept his phone calls, demanding instead to be contacted by instant messaging.

- “Podcasting”—recording college lectures, news stories, business reports, and the like for playback on the Apple iPod—allows users to listen at their convenience.

- Better communications is a major goal of many government agencies, particularly in law enforcement and disaster services, which need to coordinate the activities of many different agencies under emergency conditions.

- So-called Web 2.0 services are building communities nearly as complex and involving as those existing wholly in the real world. Second Life is a 3-D virtual world entirely built and owned by its residents. Launched in 2003, it had 16 million registered residents by October 2009, who were spending more than 45 million hours per month in the artificial world. By late 2009, MySpace and Facebook had a total of more than 425 million members (not counting overlap) who form communities of friends, most of whom have never met in person. By its third birthday, Twitter had an estimated 8 million users, sending an average of about 10,000 “tweets” per minute.

Assessment and Implications: Again, this trend has only just begun.

As the Working From Anywhere association notes, “The proliferation of high-speed and wireless Internet access ... has made it both less expensive and more productive to work remotely.” Other factors include “rising fuel and commuting

costs and the trend by employers to embrace work–life balance concepts.”

E-mail promised to speed business. Instead, it absorbs more time than busy executives can afford to lose. Expect the nascent reaction against e-mail to grow as many people eliminate mailing lists, demand precise e-communications rather than open-ended conversation, and schedule only brief periods for dealing with mail.

Instant messaging is likely to be even more destructive of time for the under-30 set. However, e-mail is a major contributor to globalization and outsourcing, because it eliminates many of the obstacles of doing business across long distances and many time zones.

Unfortunately, e-mail and other modern communications techniques also have made possible a variety of crimes, from online fraud to some forms of identity theft.

They also make it virtually impossible to retract ill-considered statements or embarrassing online activities. Once information exists on the Internet, it is all but immortal and nearly impossible to hide. Many individuals have reported that former indiscretions make it difficult to obtain or keep jobs years later. Many others have reported being fired for statements or activities reported online that their employers found unacceptable.

Generational and Family Trends

19 Family structures are becoming more diverse.

- In periods of economic difficulty, children and grandchildren move back in with parents and grandparents to save on living expenses. Many bring their own children with them. In the United States, one-third of Gen Xers have returned home at some point in their early lives. Among millennials, the figure is even higher.

- Among the poor, grandparents also provide live-in day care for the children of single mothers trying to gain an education or build a career.

- The average age of marriage is rising, and growing numbers of people either do not marry or remain single after divorce. The number of people living together outside marriage thus continues to rise.

- Nonetheless, the fastest growing “family” structure consists of a single adult living alone.

- Yet the nuclear family also is rebounding in the United States, as baby boom and Gen X parents focus on their children and grandparents retain more independence and mobility.

- Same-sex households also are gaining new acceptance. At least five American states now permit same-sex marriage or have enacted domestic-partnership laws that provide similar protections: Massachusetts, California, New Jersey, Connecticut, and New Hampshire. In this, they join such countries as Denmark, Germany, the Czech Republic, the United Kingdom, and most recently Switzerland. Many American companies now grant spousal benefits to the same-sex partners of employees, even where states do not.

- Many grandparents are raising their grandchildren, because drugs and AIDS have left the middle generation either unable or unavailable to care for their children. This trend is strongest in Africa, where AIDS has orphaned some 12 million children, half between the ages of 10 and 14. In Botswana, Lesotho, Swaziland, and Zimbabwe, more than one in five children will be orphaned by AIDS, according to UNICEF. In the seven African countries most affected by AIDS, life expectancy at birth has now dropped below 40 years.

Assessment and Implications: Where many European countries have largely adjusted to this trend, the United States has not.

Tax and welfare policies need adjustment to cope with families in which heads of households are retired or unable to work.

Policies also need modification for those who receive Social Security and work to support an extended family.

In the United States, the debates over homosexuality and the “decline of the family” will remain polarizing

for the foreseeable future.

The next debate is likely to focus on granting parental rights to more than two parents, as when a sperm or egg donor wants a role in the life of a child whose official parents are the recipients.

20 Young people place increasing importance on economic success, which they have come to expect.

- Throughout the 1990s—effectively, their entire adult lives—Gen Xers (no longer exactly young) and the millennials knew only good economic times, and the economic downturn at the turn of the century seemed to them a confusing aberration rather than a predictable part of the business cycle. Most expect to see hardship on a national level, but they both want and expect prosperity for themselves.

- Gen Xers and the millennials are the most entrepreneurial generations in history.

- In the United States especially, most young people have high aspirations, but many lack the means to achieve them. High-school dropout

rates average between 18% and 30%, depending on who does the counting. Inner-city rates are much higher by anyone's measure, with up to half of all students leaving high school before graduation in the worst districts.

- In the United States, only about one high-school graduate in four goes on to receive a college degree. Many of the rest wish to go, and are qualified to do so, but cannot afford the high cost of further schooling.

- Without higher education, expectations may never be met. On average, someone with a bachelor's degree in the United States earned \$56,118 in 2007, compared with \$32,862 for someone with only a high school diploma. High-school dropouts earned just \$24,064, while those with an advanced degree raked in \$75,140.

Assessment and Implications: Disappointed ambitions will be a major source of political unrest in the United States and many other countries in the next two decades. Most of the other countries seriously affected by this trend will be in the developing world or will be host to large numbers of disadvantaged immi-

grants.

Entrepreneurialism will be a global trend, as members of Generation X and the millennials throughout the world tend to share values. Gen X and millennial entrepreneurs are largely responsible for the current economic growth in India and China, where they are becoming a major force in the Communist party. In India, the younger generations dress and think more like their American counterparts than their parents. In China, the democratic fervor that spawned Tiananmen Square has been replaced by capitalist entrepreneurialism.

If younger-generation workers find their ambitions thwarted, they will create growing pressure for economic and social reform. If change does not come fast enough in the developing world, disappointed expectations will raise the number of young people who emigrate to the developed lands.

In the United States, pressure will grow to provide more economic assistance to qualified high-school graduates who cannot afford to go on to college.

Pressure also will grow to make



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sure that all American students have access to an education capable of preparing them for college or a rewarding career.

21 Two-income couples are becoming the norm in most of the industrialized lands, though in the United States the trend toward greater employment among women is slowing.

- The percentage of working-age women who are employed or are actively looking for work has grown steadily throughout the industrialized world.

- In the United States, it has grown from 46% in 1970 to about 66%, compared with 77% of men.

- In Japan, a majority of households have included two earners since at least 1980.

- The lowest fractions are found in Italy and Spain, with just 44% and 49% of working-age women employed, respectively, according to the Organization for Economic Cooperation and Development.

- In 2007, about 71% of American mothers worked or were actively looking for work, down from a peak of 80% four years earlier.

- The number of working mothers with young children has declined in the last few years, but the dip is extremely small.

Assessment and Implications: In the industrialized nations, this trend has just about played out, as the number of two-income households has begun to stabilize. However, it will be a growing force in India and other industrializing lands for many years to come.

This emphasis on work is one big reason the richest 25% to 50% of the U.S. population has reached zero population growth. They have no time for children and little interest in having large families.

Demand for on-the-job child care, extended parental leave, and other family-oriented benefits can only grow. In the long run, this could erode the profitability of some U.S. companies, unless it is matched by an equal growth in productivity.

Two-career couples can afford to eat out often, take frequent short vacations, and buy new cars and other

such goods. And they feel they deserve whatever time-savers and outright luxuries they can afford. This is quickly expanding the market for consumer goods and services, travel, and leisure activities.

This also promotes self-employment and entrepreneurialism, as one family member's salary can tide them over while the other works to establish a new business.

Expect to see many families that usually have two incomes, but have frequent intervals in which one member takes a sabbatical or goes back to school to prepare for another career. As information technologies render former occupations obsolete, this will become the new norm.

Work and Labor Force Trends

22 The millennial generation and their younger siblings will have major effects in the future.

- There are approximately 50 million people in Europe between the ages of 15 and 24; 30 million more are between 25 and 29. The under-30 cohort represents about 22% of the European population.

- Members of the millennial generation, now in their 20s, have more in common with their peers elsewhere than with their parents' generation. Their values and concerns are remarkably uniform throughout the world.

- The under-20 cohort is remaining in school longer and taking longer to enter the workforce than before.

- The millennial generation is proving to be even more business-oriented than their Gen X predecessors, caring for little but the bottom line. Twice as many say they would prefer to own a business rather than be a top executive. Five times more would prefer to own a business rather than hold a key position in politics or government.

- Many in Generation X were economically conservative even before they experienced the 2008–2009 recession. On average, those who can do so begin saving much earlier in

life than their parents did in order to protect themselves against unexpected adversity. They made money in the stock market boom of the 1990s, then lost it in the "dot-bomb" contraction, but have left their money in the market. For Generation X and the millennials, time is still on their side.

Assessment and Implications: In values, cultural norms, political issues, and many other ways, this change of generations will be every bit as transforming as the transition from the World War II generation to the baby boomers.

Employers will have to adjust virtually all of their policies and practices to the values of these new and different generations, including finding new ways to motivate and reward them. The millennials thrive on challenge, opportunity, and training—whatever will best prepare them for their next career move. Cash is just the beginning of what they expect.

For these generations, lifelong learning is nothing new; it's just the way life is. Companies that can provide diverse, cutting-edge training will have a strong recruiting advantage over competitors that offer fewer opportunities to improve workers' skills and knowledge base.

Millennials are well equipped for work in a high-tech world, but have little interest in their employers' needs. They have a powerful urge to do things their own way.

As both customers and employees, they will demand even more advanced telecommunications and Internet-based transactions.

23 Specialization continues to spread throughout industry and the professions.

- For doctors, lawyers, engineers, and other professionals, the size of the body of knowledge required to excel in any one area precludes excellence across all areas.

- The same principle applies to artisans. Witness the rise of post-and-beam homebuilders, old-house restorers, automobile electronics technicians, and mechanics trained to work on only one brand of car.

- Modern information-based orga-



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nizations depend on teams of task-focused specialists.

- Globalization of the economy calls for more independent specialists. For hundreds of tasks, corporations increasingly turn to consultants and contractors who specialize more and more narrowly as markets globalize and technologies differentiate.

Assessment and Implications: In an information age, each new level of specialization provides greater efficiencies, reducing the cost of doing business even as it creates new opportunities. This process will continue for at least another 20 years.

This trend creates endless new niche markets to be served by small businesses and individual consultants.

It also brings more career choices, as old specialties quickly become obsolete, but new ones appear even more rapidly.

There will also be a growing need for “synthesists,” individuals who are fluent in the languages of many different disciplines and can bridge departmental gaps. This skill will be vital for a multidisciplinary approach to problem solving in an increasingly

complex world.

24 The traditional age of retirement is losing its significance.

- OECD data show that people are retiring earlier in the developed world. Even before the recession, fewer than 60% of the 54-to-60 age group in the OECD countries had a job. This varied from 50% in the earliest-retiring nations to 76% in the latest.

- According to Pew Research, as of 2006 the average American worker planned to retire at age 61 but actually did so at 57.8.

- These “retirements” may not be permanent. Americans in particular often return to work and delay complete retirement for several years. About one in five people, and 40% of seniors, say they plan to continue working until they die.

- A study by Putnam Investments found that one-third of Americans who retire are back on the job two years later, usually in the same kind of job they left and at the same level of responsibility. This number is now rising, thanks to the stock crash of

2008, which wiped out savings and retirement accounts of many who once expected to retire permanently.

- The Bureau of Labor Statistics reports that the percentage of men and women still working at age 55 and above has been rising steadily since 1993.

- In a recent poll, 70% of American baby boomers said they expected to continue working into their 70s—not because they could not afford to retire, but because they could not stand to be both healthy and inactive.

- Yet nearly two-thirds doubt that retirement is possible for anyone with only a middle-class income.

Assessment and Implications: Given the widespread shortage of retirement savings and investments, most Americans will delay retirement until they can no longer work, whether they wish to or not.

Since the penalty on earnings of Social Security recipients has been rescinded, more American retirees will return to work, and those not yet retired will be more likely to remain on the job.

This trend will spread to other industrialized countries as the retire-

ment-age population grows and the number of active workers to support them declines.

People increasingly will work at one career, “retire” for a while (perhaps to travel) when they can afford it, return to school, begin another career, and so on in endless variations. True retirement, a permanent end to work, will be delayed until very late in life.

By 2015, we expect the average retirement age in the United States to be delayed well into the 70s. Benefits may also continue their decline, and they will be given based on need, rather than as an entitlement.

Even though the Social Security program has been the “third rail” of American politics, within five years, the retirement age will be moved back at least to 70 for early retirement and to 72 for full benefits.

Older workers will partially make up for shortages of entry-level employees. The chance to remain in the workplace will reduce the risk of poverty for many elderly people who otherwise would have had to depend on Social Security to get by.

Retirees will act as technical aides to teachers, especially in the sciences.

In the long run, it may prove impossible to maintain the tradition of retirement, except through personal savings and investment.

25 Second and third careers are becoming common, as more people make mid-life changes in occupation.

- Americans born at the tail end of the baby boom (1956 to 1964) held an average of 10 jobs between ages 18 and 38, according to BLS.

- These job jumpers continue with short-duration jobs even as they approach middle age: 70% of jobs they took between ages 33 and 39 ended within five years.

- Among these late boomers, college-educated women tended to hold the most jobs overall (11.1) between ages 18 and 38, but their job switching occurred primarily in their youth. By their middle 30s, they held on average just 2.2 jobs between the ages of 33 and 38, compared with 2.5 jobs on average for all the late boomers, and 2.7 jobs for males with less

than a bachelor’s degree.

- In a 2009 survey, 66% of American workers reported being dissatisfied with their pay, 78% were dissatisfied with their company’s retention efforts, and 76% were not satisfied with career growth opportunities at their company.

- However, 38% said they were “very satisfied” with their jobs, up from 28% in 2007.

Assessment and Implications: Based on anecdotal data and personal observation, Forecasting International estimates that people change careers on average every 10 years. Career changing is likely to increase as new technologies make old occupations obsolete even while opening new ones to replace them.

Boomers and their children will have not just two or three careers, but five or six, as dying industries are replaced by new opportunities.

“Earn while you learn” takes on new meaning: Most people will have to study for their next occupation, even as they pursue their current career.

In many two-earner couples, one member or the other will often take a sabbatical to prepare for a new career.

Self-employment is becoming an increasingly attractive option, as being your own boss makes it easier to set aside time for career development. This is especially true for Gen Xers and millennials.

Growing numbers of retirees will start their own businesses, both to keep occupied and to supplement their meager savings with new income. This trend has already begun.

Retirement plans must be revised so that workers can transfer medical and pension benefits from one career to the next—a change that has long been needed. We believe this will occur soon after the baby-boom generation begins to retire in 2011.

26 The traditional “Protestant work ethic” is vanishing.

- The conventional work ethic derived from the ideas of John Calvin, who ascribed a transcendent value to all work as central to a “good” life. The baby boomers’ parents were probably the last generation of

Americans who broadly accepted that notion, which even then had been largely diluted to the slogan, “an honest day’s work for an honest day’s pay.”

- Nearly one-third of U.S. workers reported calling in sick when they were not ill at least once in the past 12 months, and 12% admitted doing so in order to avoid something work related, such as to miss a meeting, according to a 2009 survey by CareerBuilder.com.

- Job security and high pay are not the motivators they once were, because social mobility is high and people seek job fulfillment. Some 48% of those responding in a recent Louis Harris poll said they work because it “gives a feeling of real accomplishment.”

- Fifty-five percent of the top executives interviewed in the poll said that erosion of the work ethic will have a major negative effect on corporate performance in the future.

- Ethics at the top are no better. Enron, WorldCom, Tyco International, Adelphia Cable, and ImClone just begin the list of companies implicated in deceptive accounting practices, looting of corporate assets, and other misdeeds. And the number of American political leaders either under investigation for corruption or convicted of it grows almost daily.

- Seeking the root of such problems, a Zogby International poll of college seniors found that 97% said that their studies had prepared them to act ethically in the future. However, 73% said that professors had taught them that right and wrong are not susceptible to uniform standards, but depend on individual values and cultural norms.

Assessment and Implications: Both employers and voters must do their best to find candidates who can be trusted, but must expect to fail in their search. This makes safeguards against wrongdoing, both at work and in public life, more important than ever. There is little prospect that this will change until the children of today’s young adults grow up to rebel against their parents’ values.

The new generation of workers cannot simply be hired and ignored. They must be nurtured, paid well,

and made to feel appreciated, or they will quickly look for a friendlier, more rewarding workplace.

Training is crucial. Without the opportunity to learn new skills, young people will quickly find a job that can help them prepare for the rest of their career.

Energy Trends

27 Despite efforts to develop alternative sources of energy, oil consumption is still rising rapidly.

- The world used only 57 million barrels of oil per day in 1973, when the first major price shock hit. By 2008, it was using 86 million barrels daily, according to the U.S. Energy Information Administration (EIA). This was slightly more than it produced that year.

- The United States alone consumed about 19.5 million barrels of oil per day in 2008 (22.8% of world total), down from 20.7 million in 2004 (25.1% of world total). U.S. petroleum consumption is projected to increase to 22 million barrels per day by 2035.

- In 2008, China consumed 7.8 million barrels of oil per day, making it the second-largest user of oil in the world. Its oil demand has grown by 7% per year, on average, since 1990. Most of China's imported oil (more than 3.1 million barrels a day) comes from the Middle East.

- However, oil's share of world energy consumption has begun to decline: It is expected to drop from 40% in 1999 to about 37% in 2020.

Assessment and Implications: Consumption is expected to reach 97 million barrels daily by 2015 and 118 million by 2030. These projections seem likely to prove reasonably accurate.

Oil prices now are high enough to provide an incentive to develop new fields, such as the Arctic National Wildlife Refuge and the deep fields under the Gulf of Mexico.

Environmentally sensitive areas will be developed using new drilling techniques, double-walled pipelines, and other precautions that make it possible to extract oil with less damage to the surroundings. But they



JULIEN GRONDIN / ISTOCKPHOTO

will be developed.

Any prolonged rise of oil prices to triple digits will erode support for environmental protections in the United States, leading to widespread development of whatever energy sources are most readily available regardless of the long-term consequences.

28 Contrary to popular belief, the world is not about to run out of oil.

- As a result of intensive exploration, the world's proven oil reserves climbed steadily since the 1980s and hovered around 1.3 trillion barrels in 2007, the most recent figure currently available.

- Recent discoveries of major oil fields in Canada, Brazil, and under the Gulf of Mexico have substantially increased the world's known oil reserves. Exploitation of oil in Venezuela has barely begun. Reserves there may be even larger than those in Saudi Arabia, according to some estimates. However, it is more expensive to refine and use, because it contains much higher levels of sulfur than the Middle Eastern oil currently in production. India also is believed to own substantial reserves of oil in deposits

beneath the Indian Ocean.

- OPEC officials claim that the 11 member countries can provide for the world's energy needs for roughly the next 80 years. OPEC supplies about 40% of the world's oil and holds 60% of the known oil available internationally. Even 80% of OPEC's estimated supply would still be oil enough to supply the world for the next 64 years.

Assessment and Implications: Talk of "peak oil," the suggestion that crude production has topped out or soon will, is unjustified and, in FI's view, unjustifiable.

Higher oil prices should make it cost effective to develop new methods of recovering oil from old wells. Technologies already developed could add nearly 50% to the world's recoverable oil supply.

OPEC will continue to supply most of the oil used by the developed world. According to the U.S. Department of Energy, OPEC oil production will grow to about 57 million barrels of oil per day by 2020.

Russia and Kazakhstan will be major suppliers if the necessary pipelines can be completed and political uncertainties do not block investment by Western oil companies. Rus-

sia has been the world's second-largest oil producer since 2008.

Alternative energy sources face problems with economic viability. Barring substantial incentives, this will inhibit efforts to stem global warming for the foreseeable future.

A generalized war in the Middle East after the United States leaves Iraq could drastically reduce the region's oil output. This is unlikely, but the impact of such a conflict would be too large to ignore the possibility.

The spread of fundamentalist Islamic regimes with a grudge against the West also could keep OPEC oil out of the American market.

If the United States loses access to Middle Eastern oil, it will buy even more from Canada and Venezuela and tap the Arctic National Wildlife Reserve much faster than expected.

In a prolonged energy emergency, America also would be likely to develop its vast reserves of oil shale, which have long been economically viable at crude prices over \$40 per barrel. New technology reportedly makes it profitable at any price over \$17 per barrel. With enough shale oil to supply its own needs for 300 years, the United States could become one of the world's largest petroleum exporters.

Developing shale would devastate the environment, but with crude oil prices in triple digits during a Middle Eastern war, the environment will be considered expendable.

29 When not perturbed by political or economic instability, oil prices will average around \$65 per barrel.

- The International Energy Agency's *World Energy Outlook 2007* concurs.

- Prices approaching \$100 per barrel in the fall of 2007 were an aberration caused by a global shortage of refinery capacity and by fears of instability triggered by the Iraq war. New energy demand from the fast-growing economies of China and India has raised the floor that until 2004 supported oil in the \$25 per barrel range. The "risk premium" built into the price of oil is estimated at \$10 to \$15 per barrel.

- Yet in the long run other factors will tend to depress the price of oil

toward its former levels. New refineries in Saudi Arabia and other countries scheduled to come on line by 2012 will ease the tight supply-demand balance for oil. New oil supplies are being found or developed in many parts of the world. The 20 most-industrialized countries all have at least three-month supplies of oil in tankers and underground storage. Most have another three months' worth in "strategic reserves." In times of high oil prices, customer nations can afford to stop buying until the costs come down. And OPEC has stated that it prefers to see the price of oil in the neighborhood of \$45 per barrel.

Assessment and Implications:

Barring an American invasion of Iran, any excursions beyond \$100 per barrel will be extremely brief. Given continued concerns about instability in the Middle East, oil prices will slowly decline to \$60 or so per barrel.

In response to high (by American standards) gas prices, the U.S. government probably will boost domestic oil production and refining to increase the reserve of gasoline and heating oil. This stockpile would be ready for immediate use in case of future price hikes. This will make it easier to negotiate with OPEC.

A key step in controlling oil prices, and an indicator of Washington's seriousness about doing so, would be development of at least four new refineries around the country by the government, probably for lease to commercial producers. We rate the odds at no more than 50:50.

The United States almost certainly will drill for oil in the Arctic National Wildlife Reserve, though efforts will be made to minimize environmental damage, such as drilling will take place only in the winter, when the tundra is rock hard.

30 Growing competition from other energy sources also will help to limit the price of oil.

- Nuclear power is growing rapidly. Nuclear plants supply about 15% of Russian electricity. By 2020, Russia will consume 129 billion kWh of nuclear energy per year. Plans call for construction of 26 more nuclear plants by 2030, when 25% or more of

the nation's electricity will be nuclear. In early 2004, China had only nine operating nuclear power plants. It plans to build 30 more by 2020, bringing nuclear energy consumption from 16 billion kWh in 2000 to 142 billion kWh. By 2020, Canada will use 118 billion kWh. Even the United States is weighing the construction of new reactors.

- Renewable sources accounted for about 14% of the world's energy in 2005. However, more than half of the world's renewable energy came from hydroelectric dams. Hydroelectric power generation has been declining since its peak of 727.62 billion kWh in 1996.

- Worldwide wind-power generating capacity grew by 30% annually in the decade ending in 2005, to a total of 59,000 MW, according to the Earth Policy Institute and the Worldwatch Institute. This is a 12-fold increase in 10 years.

- Photovoltaic solar energy production has been growing at a steady 25% per year since 1980. Commercial solar cells are now cheap enough to compete with other power sources, especially in sunny regions.

- Natural gas burns cleanly, and there is enough of it available to supply the world's total energy demand for at least the next 200 years. Consumption of natural gas is growing by 3.3% annually, compared with 1.8% for oil. Proven natural gas reserves stood at about 237 trillion cubic feet in 2009, about 1% more than a year earlier, but the total gas available is believed to be more than 2,000 trillion cubic feet. The United States has been described as "the Saudi Arabia of natural gas." Its shale gas accounts for an estimated 35% of the world's total natural gas supply. New technologies have made it economically practical to develop this supply.

- Although most of the world's scientists gave up on cold fusion long ago, the U.S. Navy has continued work on the process. Its researchers have announced development of a reproducible cold fusion system that consistently releases more energy than it consumes.

- According to the DOE's Energy Information Agency, shifting 20% of America's energy supply to renew-

able resources by 2020 would have almost no impact on the total cost of power. At present, less than 5% of the energy used in the United States comes from renewable resources.

Assessment and Implications: Though oil will remain the world's most important energy resource for years to come, two or three decades forward it should be less of a choke point in the global economy.

Solar, geothermal, wind, and wave energy will ease power problems where these resources are most readily available, though they will supply only a very small fraction of the world's energy in the foreseeable future.

Declining reliance on oil eventually could help to reduce air and water pollution, at least in the developed world. By 2060, a costly but pollution-free hydrogen economy may at last become practical.

Fusion power remains a distant hope.

Cold fusion also remains a long shot for practical power, but FI believes it can no longer be discounted. Reported confirmations of the phenomenon, including the one by the U.S. Navy, seem highly credible. If they prove to be correct, power plants based on the process could begin to come on line by 2030.

Environmental and Resource Trends

31 People around the world are becoming increasingly sensitive to environmental issues as the consequences of neglect, indifference, and ignorance become ever more apparent.

- The World Health Organization estimates that 3 million people die each year from the effects of air pollution. In the United States, an estimated 64,000 people a year die of cardiopulmonary disease caused by breathing particulates. In sub-Saharan Africa, the toll is between 300,000 and 500,000 deaths per year. Pollution-related respiratory diseases kill about 1.4 million people yearly in China and Southeast Asia.

- In developing countries, indoor

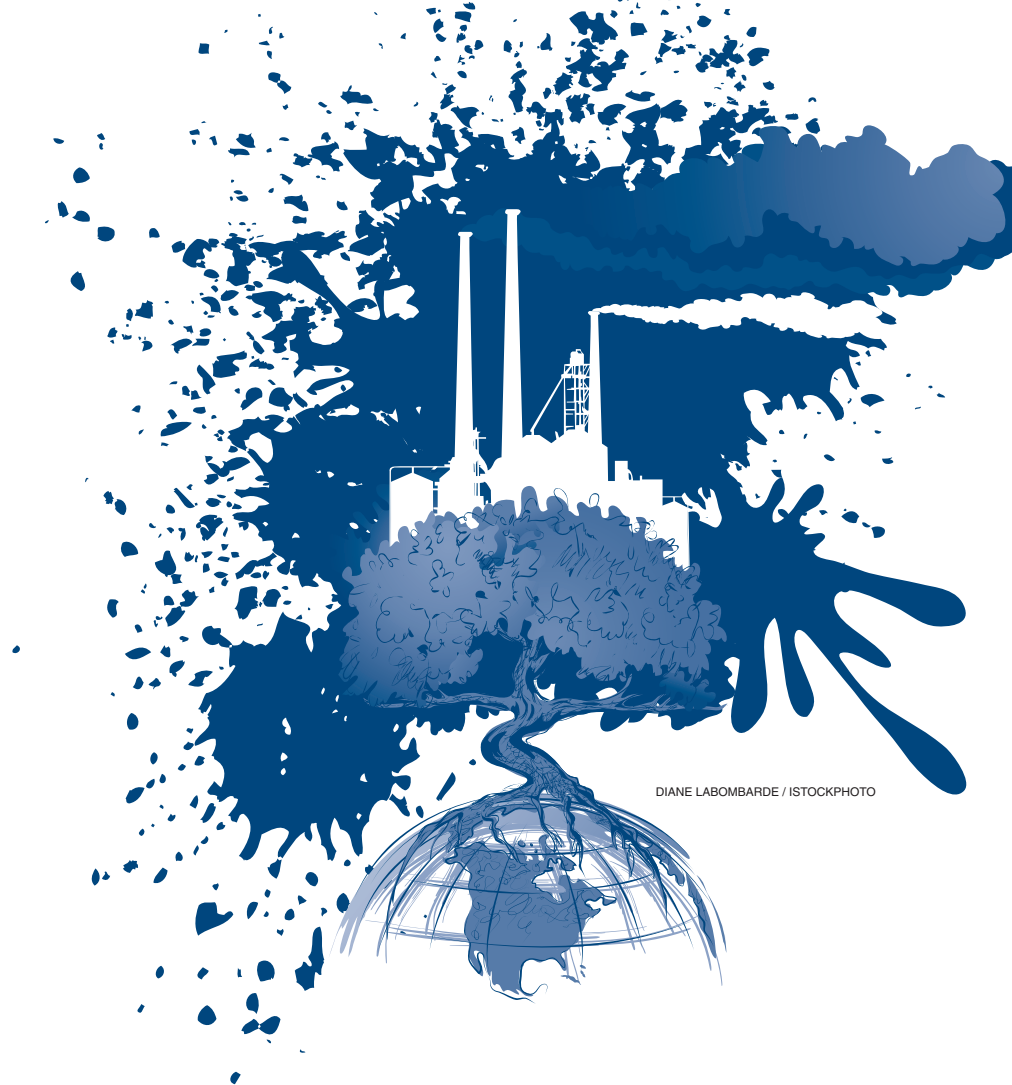
air pollution is an even bigger problem. Indoor smoke from burning fuels such as dung and wood—which more than half the world's population relies on for cooking and other basic energy needs—creates particulates that penetrate deeply into the lungs. An estimated 1.6 million people a year die from indoor air pollution, according to the WHO.

- Contaminated water is implicated in 80% of the world's health problems, according to WHO. An estimated 40,000 people around the world die each day of diseases directly caused by contaminated water, more than 14 million per year. In India, an estimated 300 million people lack access to safe drinking water, due to widespread pollution of rivers and groundwater. The European Parliament estimates that 70% of the Continent's drinking water contains dangerous concentrations of nitrate pollution. In the United States, there is growing con-

cern that pollutants such as perchlorate, the gasoline additive MTBE, and even the chlorine used to kill waterborne pathogens may represent significant health concerns.

- Though some debate remains about the cause, the fact of global warming has become undeniable. At Palmer Station on Anvers Island, Antarctica, the average annual temperature has risen by 3°C to 4°C since the 1940s, and by an amazing 7°C to 9°C in June—early winter in that hemisphere.

- Pew Research Center reports that its 2007 Global Attitudes Project survey of 46 countries found much more concern for the environment than in the 2002 survey. In the United States, the number citing environmental problems as the top global threat rose from 23% to 37%. In India, the number went from 32% to 49%. In both Japan and China, 70% of respondents said environmental problems were the greatest global threat



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to the world.

- Many governments are taking more-active measures to protect the environment. For instance, after years of ineffective gestures, Costa Rica has incorporated about 25% of its land into protected areas, such as national parks. In an effort to promote cleaner energy technologies and to slow global warming, most European nations now tax carbon emissions or fossil fuels. Anticipating a three-foot rise in sea levels, the Netherlands is spending \$1 billion to build new dikes.

Assessment and Implications: A solid majority of voters throughout the developed world now recognize the need to clean up the environment, and especially to control greenhouse warming. Throughout most of the world, polluters and private beneficiaries of public assets will increasingly confront restrictive regulations designed to serve the interests of the community at large.

Carbon dioxide will remain a problem for many years to come. If air pollution were halted instantly, it would take an estimated 200 years for CO₂ and other greenhouse gases to return to preindustrial levels.

Impurities in water will become an even greater problem as the population of the developed countries ages and becomes more susceptible to infectious diseases.

Recent analyses say there is a 90% chance that the planet's average annual temperature will rise between 3°C and 9°C over the next century. This will cause severe dislocations both for plant and animal populations and for many human activities.

Environmental policies will provoke a political backlash wherever they conflict with entrenched interests, as they have long done in the American West.

32 Industrial development still trumps environmental concerns in many parts of the world.

- The Pew study cited above found that less than one-fourth of respondents in any African country rated environmental problems as the world's most important threat. In Ethiopia, where desertification is at its worst and drought is a constant

threat, only 7% did so.

- Beijing has made repairing the environment a national priority. Yet 70% of the energy used in China comes from coal-burning power plants, few of them equipped with pollution controls. The country intends to build more than 500 additional coal-fired plants in the next 10 years. Scientists estimate that by 2025 China will emit more carbon dioxide and sulfur dioxide than the United States, Japan, and Canada combined.

Assessment and Implications: Broad regions of the planet will be subject to pollution, deforestation, and other environmental ills in the coming decades.

Acid rain like that afflicting the United States and Canada will appear wherever designers of new power plants and factories neglect emission controls.

India is covered by a haze of sulfates and other chemicals associated with acid rain. Look for this problem to appear in most other industrializing countries.

Diseases related to air and water pollution will spread dramatically in the years ahead. Already, chronic obstructive pulmonary disease is five times more common in China than in the United States. As citizens of the developing countries grow to expect modern health care, this will create a growing burden on their economies.

This is just a taste of future problems, and perhaps not the most troublesome. Even the U.S. government now admits that global warming is a result of human activities that produce greenhouse gases. It now seems that China and India soon will produce even more of them than the major industrialized nations. Helping the developing lands to raise their standards of living without creating wholesale pollution will require much more aid and diplomacy than the developed world has ever been willing to give this cause.

33 Water shortages are a growing problem for much of the world.

- In many regions, they are severe already. The northern half of China,

home to perhaps half a billion people, already is short of water. The water table under Beijing has fallen 200 feet since 1965. Australia's Murray-Darling river system, which supplies water for 40% of the country's crops and 80% of its irrigation, no longer carries enough water to reach the sea without constant dredging. Salinity in the Murray is rising so quickly that the water is expected to be undrinkable in 20 years.

- There is worse to come. According to UN studies, at least 3.5 billion people will run short of water by 2040, almost 10 times as many as in 1995. By 2050, fully two-thirds of the world's population could be living in regions with chronic, widespread shortages of water. One-third of the population of Africa and most of the major cities in the developing world will face water shortages, according to the United Nations. Many climatologists believe that global warming will make drought in the United States much more frequent—even the norm—west of the Mississippi River.

- Water usage is causing other problems as well. For example, irrigation water evaporates, leaving minerals in the soil. By 2020, 30% of the world's arable land will be salty; by 2050, 50%. Salinization already is cutting crop yields in India, Pakistan, Egypt, Mexico, Australia, and parts of the United States.

- An estimated 38% of the world's land is threatened with desertification, owing mostly to overgrazing, overcultivation, and deforestation. Northern Africa, the Middle East, southwest China, and the western edge of South America are at the greatest risk.

Assessment and Implications: Providing adequate supplies of potable water will be a growing challenge for developing and developed countries alike.

Such problems as periodic famine and desertification can be expected to grow more frequent and severe in coming decades.

In many lands, including parts of the United States, growing water shortages may inhibit economic growth and force large-scale migration out of afflicted areas.

Climate change is expected to re-

duce the flow of Australia's parched Murray River by a further 5% in 20 years and 15% in 50 years.

Countries dependent on hydro-power face growing shortages of electricity. Most are relatively poor lands in Africa and Asia, which will find economic development even more challenging. Venezuela has already rationed electricity, owing to low reservoir levels behind the Guri dam, which produces 70% of the country's electric power.

Water wars, predicted for more than a decade, are a threat in places like the Kashmir: Much of Pakistan's water comes from areas of Kashmir now controlled by India.

Other present and future water conflicts involve Turkey, Syria, and Iraq over the Tigris and Euphrates; Israel, Jordan, Syria, and Palestine over water from the Jordan River and the aquifers under the Golan Heights; India and Bangladesh, over the Ganges and Brahmaputra; China, Indochina, and Thailand, over the Mekong; Kyrgyzstan, Tajikistan, and Uzbekistan over the Oxus and Jaxartes rivers; and Ethiopia, Sudan, and at least six East African countries, including Egypt, which share the Nile.

In the United States, repair of decayed water systems is likely to be a major priority for older cities such as New York, Boston, and Atlanta. Cost estimates for necessary replacement and repair of water mains range up to \$1 trillion.

34 Recycling has delayed the "garbage glut" that threatened to overflow the world's landfills, but the threat has not passed simply because it has not yet arrived.

- Americans now produce about 4.5 pounds of trash per person per day, twice as much as they threw away a generation ago. In 2005, they sent about 245 million tons of "municipal solid waste" to landfills. Seventy percent of U.S. landfills will be full by 2025, according to the EPA.

- Japan expects to run out of space for municipal solid waste by 2015.

- In London and the surrounding region, landfills will run out of room by 2012.

- In some other regions, simply

collecting the trash is a problem. Brazil produces an estimated 240,000 tons of garbage daily, but only 70% reaches landfills. The rest, 72,000 tons per day, accumulates in city streets, where it helps to spread disease.

- Recycling has proved to be an effective alternative to dumping. Some 37% of London's municipal waste is recycled, with a target of 45% by 2020. Seattle, with one of the most effective recycling programs in the United States, recycles about half of its solid waste. As of 2005, Germany recycled 60% of its municipal solid waste, 65% of manufacturing waste, 80% of packaging, and 87% of construction waste, according to the Federal Ministry for Environment, Nature Conservation and Nuclear Safety. Largely as a result, the number of landfills for domestic waste has been reduced from about 50,000 in the 1970s to just 160.

Assessment and Implications: Recycling and waste-to-energy plants are a viable alternative to simply dumping garbage.

Expect a wave of new regulations, recycling, waste-to-energy projects, and waste management programs in the United States and other countries in an effort to stem the tide of trash. In the United States it will of course begin in California, a jurisdiction often cited by policy forecasters as a bellwether of change.

State and local governments will tighten existing regulations and raise disposal prices in Pennsylvania, South Carolina, Louisiana, and other places that accept much of the trash from major garbage producers such as New York.

Trash producers in the developed world will ship much more of their debris to repositories in developing countries. This will inspire protests in the receiving lands.

Beyond 2025 or so, the developing countries will close their repositories to foreign waste, forcing producers to develop more waste-to-energy and recycling technologies. Ultimately, it may even be necessary to exhume buried trash for recycling to make more room in closed dump sites for material that cannot be reused.

Waste-to-energy programs will

make only a small contribution to the world's growing need for power.

35 Species extinction and loss of biodiversity will be a growing worry for decades to come.

- An estimated 50,000 species disappear each year, up to 1,000 times the natural rate of extinction, according to the United Nations Environmental Program. By 2100, as many as half of all species could disappear. Twelve percent of birds, 21% of mammals, 30% of known amphibians, and 32% of all conifers and cycads are estimated to be nearing extinction. Some 17,291 species are now listed as threatened, according to the 2009 Red List of the International Union for Conservation of Nature and Natural Resources. The real list is likely much larger, as the group has evaluated only 47,677 of the 1.5 million species on its list. Amphibian populations are in decline throughout the world, for reasons that remain poorly understood.

- Coral reefs throughout the world are dying rapidly. Caribbean reefs have lost 80% of their coral cover in the past three decades. In Indonesia, home to one-eighth of the world's coral reefs, more than 70% of the reefs are dead or dying. Most scientists believe that climate change is largely responsible for killing coral. Other suspected culprits are overfishing and pollution.

- Just 25 so-called "hot spots" covering 11% of the world's surface have lost 70% of their original vegetation. These hot spots are home to 1.2 billion people, or one-fifth of the world's population.

- What is left in its natural state, about 2% of the planet's surface, is home to 44% of all plant species and 35% of all vertebrates other than fish.

- The chief cause for species loss is the destruction of natural habitats by logging, agriculture, and urbanization. Some 30 million acres of rain forest are destroyed each year. More than half the world's rain forests are already gone. At current rates, the rest could disappear in the next 40 years.

- Though commercial fishing is not known to have exterminated any species—largely because the last few

members of a species are too costly to catch—it is turning out to be one more important cause of species depletion. Stocks of cod, tuna, swordfish, marlin, and sharks are down 90% since modern industrialized fishing began 40 years ago.

Assessment and Implications: Saving any significant fraction of the world's endangered species will require much more effort and expense than many governments find acceptable. For species such as corals, whose loss is attributable largely to climate change, it may not be possible.

Species loss has a powerful negative impact on human well-being. Half of all drugs used in medicine are derived from natural sources, including 55 of the top 100 drugs prescribed in the United States. About 40% of all pharmaceuticals are derived from the sap of vascular plants. So far, only 2% of the 300,000 known sap-containing plants have been assayed for useful drugs. Most of the species lost in the years ahead will disappear before they can be tested.

The Indonesian economy loses an estimated \$500,000 to \$800,000 annually per square mile of dead or damaged reef.

Australia may lose even more as degradation of the Great Barrier Reef continues. The UN Intergovernmental Panel on Climate Change predicts that the reef will be "functionally extinct" by 2030.

Diverse ecosystems absorb more carbon dioxide than those with fewer species. Loss of biodiversity thus is a potential cause of global warming.

36 Urbanization, arguably the world's oldest trend, continues rapidly.

- Forty-eight percent of the world's population currently lives in cities, according to the Population Reference Bureau's World Population Data Sheet. By 2030, that will figure grow to 60%, as some 2.1 billion people are added to the world's cities. More than three-fourths of the population in developed countries live in cities. In North America, urbanization is the highest, at 79%. But cities are growing fastest in the developing world.

- The big are getting bigger. In 1950, there were just eight megacities, with populations exceeding 5 million, in the world. By 2015, there will be 59 megacities, 48 of them in less developed countries. Of these, 23 will have populations over 10 million, all but four in the developing lands.

- Natural increase now accounts for more than half of population increase in the cities; at most, little more than one-third of urban growth results from migration.

- Up to 1 billion city dwellers lack adequate shelter, clean water, toilets, or electricity. The United Nations estimates that these problems cause 10 million needless deaths annually.

- Urbanization has significant environmental consequences: Fuels burned in cities account for 75% of global carbon emissions from human activity, according to the Worldwatch Institute. NASA scientists point out that urbanization also tends to put buildings and blacktop on the most fertile land, eliminating significant quantities of carbon-absorbing plants. Urbanization also deprives surrounding areas of water: Instead of sinking into the ground, rain is collected, piped to the city, used, treated as gray water, and then discarded into the ocean. In some regions, such as near Atlanta, water levels in local aquifers are declining rapidly because the water that once replenished them now is lost.

- The United States is the one major exception to the global urbanization trend. This automobile-reliant society built one of the best highway systems in the world and has relatively little mass transit, so more Americans live in the suburbs than in the cities.

Assessment and Implications: Continuing urbanization will aggravate most environmental and social problems. Cities' contribution to global warming can only increase in the years ahead.

As the world's supply of potable water declines, people are concentrating in those areas where it is hardest to obtain and is used least efficiently. This trend will aggravate water problems for so long as it continues.

Many more people will die due to

shortages of shelter, water, and sanitation. Epidemics will become still more common as overcrowding spreads HIV and other communicable diseases more rapidly.

Since urban growth is now due more to natural increase than to migration, programs designed to encourage rural populations to remain in the countryside may be misplaced. Education and family planning seem more likely to rein in the growth of cities.

Technology Trends

37 Technology increasingly dominates both the economy and society.

- New technologies are surpassing the previous state of the art in all fields, and technological obsolescence is accelerating.

- For most users, computers have become part of the environment, rather than just tools used for specific tasks. With wireless modems, portable computers give us access to networked data wherever we go. Internet-equipped cell phones are even more convenient for access to e-mail and Web sites.

- Robots are taking over more and more jobs that are routine, remote, or risky, such as repairing undersea cables and nuclear power stations. Flexible, general-service personal robots will appear in the home by 2015, expanding on the capabilities of devices such as robotic vacuum cleaners and lawn mowers.

- By 2015, artificial intelligence, data mining, and virtual reality will help most companies and government agencies to assimilate data and solve problems beyond the range of today's computers. AI applications include robotics, machine vision, voice recognition, speech synthesis, electronic data processing, health and human services, administration, and airline pilot assistance.

- Superconductors operating at economically viable temperatures will be in commercial use soon after 2015.

Assessment and Implications: Technologically related changes in society and business seen over the last 20 years are just the beginning of



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a trend that will accelerate at least through this century.

New technologies should continue to improve the efficiency of many industries, helping to keep costs under control.

However, this increased productivity has retarded U.S. job creation since at least 2002. Other developed countries are likely to feel the same effect in the future.

Technology made international outsourcing possible. It will continue to promote outsourcing, to the benefit of the recipient countries, but causing painful job losses in the donor lands.

New technologies often require a higher level of education and training to use them effectively. They also provide many new opportunities to create businesses and jobs.

Automation will continue to cut the cost of many services and products, making it possible to reduce prices while still improving profits. This will be critical to business survival as the Internet continues to push the price of many products to the commodity level.

38 The United States is losing its scientific and technical leadership to other countries.

- “The scientific and technical building blocks of our economic leadership are eroding at a time when many other nations are gathering strength,” the National Academy

of Sciences warns. “Although many people assume that the United States will always be a world leader in science and technology, this may not continue to be the case inasmuch as great minds and ideas exist throughout the world. We fear the abruptness with which a lead in science and technology can be lost—and the difficulty of recovering a lead once lost, if indeed it can be regained at all.”

- According to the National Science Board, R&D spending grows by 6% per year in the United States, on average. China spends 20% more on R&D each year.

- China is now second to the United States in the number of research articles its scientists publish each year and gaining rapidly.

- In patents earned each year, Americans are now in sixth place and falling.

- Military research now absorbs much of the money that once supported basic science. Since 2000, U.S. federal spending on defense research has risen an average of 7.4% per year, compared with only 4.5% for civilian research. The Defense Advanced Research Projects Agency has been legendary for its support of “blue sky” research that led to dramatic technical advances, including the creation of the Internet. Today it focuses increasingly on immediate military needs and low-risk development efforts.

- More than half of American scientists and engineers are nearing re-

irement. At the rate American students are entering these fields, the retirees cannot be replaced except by recruiting foreign scientists. According to the National Academy of Engineering, the United States produces only about 7% of the world’s engineers. Only 6% of American undergraduates are engineering majors, compared with 12% in Europe and 40% in China. Of the doctoral degrees in science awarded by American universities, about 30% go to foreign students. In engineering, it is 60%.

- By inhibiting stem-cell research, cloning, and other specialties the United States has made itself less attractive to cutting-edge biomedical scientists. The United Kingdom is capitalizing on this to become the world’s leader in stem-cell research. In the process, it is reversing the brain drain that once brought top British scientists to the United States. More than 70 leading American biomedical researchers have moved to the U.K. along with many less noted colleagues. Latin America also has been receiving scientific émigrés from the United States.

- About 25% of America’s science and engineering workforce are immigrants, including nearly half of those with doctoral degrees. During the 15 years ending in 2007, one-third of the American scientists receiving Nobel Prizes were foreign-born.

- According to Purdue University

President Martin Jischke, more than 90% of all scientists and engineers in the world live in Asia.

Assessment and Implications: If this trend is not reversed, it will begin to undermine the U.S. economy and shift both economic and political power to other lands. According to some estimates, about half of the improvement in the American standard of living is directly attributable to research and development carried out by scientists and engineers.

Demand to import foreign scientists and engineers on H-1b visas also will continue to grow. Publicity about the H-1b program, and about the offshoring of R&D to company divisions and consulting labs in Asia, in turn will discourage American students from entering technical fields. This has already been blamed for shrinking student rolls in computer science.

In 2005, China for the first time exported more IT and communications goods (\$180 million) than the United States (\$145 million.) Its lead has grown each year since then.

39 Transportation technology and practice are improving rapidly.

- The newest generation of aircraft, such as the Boeing 787 and future Airbus A350 XWB, are using lightweight materials and more efficient engines to cut fuel costs, stretch ranges, and increase cargo capacity.

- The airline industry is developing technical advances such as improved satellite navigation and communications, runway collision avoidance systems, and safer seat designs. These advances will allow planes to fly closer together, increasing the carrying capacity of air routes.

- Rail travel is getting faster. The TGV Est line, which runs 300 km (180 miles) from Paris to Frankfurt, operates at 320 kph (198.8 mph) inside France, compared with 300 kph on other parts of the TGV system.

- Advances in automobile technology such as road-condition sensors, continuously variable transmissions, automated traffic management systems, night-vision systems, and smart seats that tailor airbag infla-

tion to the passenger's weight are reaching the marketplace.

- European researchers are experimenting with "auto trains" in which a long line of cars automatically trails after a leader. This allows tighter, more efficient spacing of vehicles, and fewer delays.

- The United States has finally committed to funding its first relatively high-speed rail line, between Tampa and Orlando, Florida.

Assessment and Implications: These advances will make travel faster, cheaper, and safer, by land, sea, and air.

One of the fastest-growing transport industries is trucking, thanks to the expanded use of just-in-time inventory management and Internet-based companies that rely on trucks to deliver their products. This field will grow more efficient as GPS-based truck tracking, RFID-based cargo management, more efficient engines, and other new technologies spread through the industry.

To reduce the number and severity of traffic accidents, trucks on the most heavily used highways will be exiled to car-free lanes, and the separation will be enforced.

New hybrid car models will begin to gain significant market share from traditional gas guzzlers between 2010 and 2015.

Following European practice, even "legacy" air carriers in the United States will begin to replace the spokes of their existing hub-and-spokes system with high-speed trains for journeys of 100 to 150 miles.

By 2015, improved technologies and concerns about the long-term cost of energy will lead even the rail-resistant United States to begin modernizing its train system.

New aircraft navigation and safety technologies will reduce the number and severity of crashes.

In Europe, smart-car technologies will begin to reduce deaths due to auto accidents in 2010, and, in the United States, a few years later.

Cities increasingly will struggle to reduce auto congestion by limiting the use of private automobiles, as in Munich, Vienna, and Mexico City; by taxing auto use in congested areas, as in London; or by encouraging the de-

velopment and use of mass transit, as in Copenhagen and Curitiba, Brazil.

Technology may offer other alternatives. One proposal is "dual-mode transportation," in which private cars would be used normally on short hauls but would run on automated guideways for long-distance travel.

40 The pace of technological change accelerates with each new generation of discoveries and applications.

- In fast-moving engineering disciplines, half of the cutting-edge knowledge learned by college students in their freshman year is obsolete by the time they graduate.

- The design and marketing cycle—idea, invention, innovation, imitation—is shrinking steadily. As late as the 1940s, the product cycle stretched to 30 or 40 years. Today, it seldom lasts 30 or 40 weeks. Almost any new consumer product can be exactly duplicated by Chinese factories and sold on eBay within a week after it is introduced.

- Eighty percent of the scientists, engineers, technicians, and physicians who ever lived are alive today—and exchanging ideas real time on the Internet.

Assessment and Implications: Subjectively, change soon will move so rapidly that we can no longer recognize its acceleration, save as an abstract concept.

All the technical knowledge we work with today will represent only 1% of the knowledge that will be available in 2050.

Industries will face much tighter competition based on new technologies. Those who adopt state-of-the-art methods first will prosper. Those who ignore them eventually will fail. Products must capture their market quickly, before the competition can copy them. Brand names associated with quality are becoming even more important in this highly competitive environment.

Lifelong learning is a necessity for anyone who works in a technical field—and for growing numbers who do not.

In what passes for the long run—a generation or two—the development

of true artificial intelligence is likely to reduce human beings to managers. Rather than making new discoveries and creating new products, we will struggle to understand and guide the flow of novelties delivered by creations we cannot really keep up with.

41 Important medical advances will continue to appear almost daily.

- Genetic research has accelerated advances in medicine and in the growth of medical knowledge. Early results include possible cures for hemophilia, cystic fibrosis, familial hypercholesterolemia, a number of cancers, and AIDS. Eventually, some 4,000 hereditary disorders may be prevented or cured through genetic intervention. At Sangamo Biosciences in California, researchers have experimented with rewriting the patient's own DNA, rather than replacing it, to correct hereditary errors. The technique may lead to practical therapies sooner than conventional gene splicing. Also in the works: gene-based diagnostic tests that may identify cancer early and tell which drugs are most likely to benefit individual patients with heart disease, cancer, and other ills. Already, roughly 1,000 clinical trials of gene therapy are under way in the United States alone.

- A process called RNA interference, which deactivates individual genes, is quickly revealing the genes' functions. It also may be used to disable disease-causing genes, perhaps making it possible to cure cancer, viral illnesses, and some hereditary disorders. One potential cure for HIV / AIDS is expected to be ready for human testing in 2010.

- In research performed outside the United States, stem cells promise to repair damaged brains and other organs. Embryonic stem cells have already been found to repair damaged heart muscle.

- Growing knowledge of biochemistry, aided by advanced computer modeling, has made it possible to design drugs that fit specific receptors in the cell. Drugs created through this technology often are much more effective than natural de-

rivatives and have fewer side effects. Nearly 400 anticancer compounds are being tested in people, almost all of them "designer drugs." In 1995, only 10 anticancer drugs were being tested, all either natural products or derivatives of existing drugs.

- Other transplanted tissues come from cloning and related technologies used to grow stem cells. Radical new treatments for diabetes, Parkinson's disease, perhaps Alzheimer's, and many other disorders are expected to arrive within the next five to 10 years.

- Brown fat, found in many animals and in human babies, is converted almost immediately to body heat; it does not cause obesity. White fat goes straight to the waist and other bulging body parts. Scientists at Boston's Dana-Farber Cancer Institute have found the gene controlling brown fat production, perhaps opening the way to end the epidemic of obesity.

- Surgeons working via the Internet can now operate on patients in remote areas, using experimental robot manipulators to handle their instruments.

- Nanotechnology research is beginning to produce medically useful products, such as nanoparticles that can carry medication into the cell. Much more complicated devices for both diagnosis and treatment are in the concept stage.

- Scientists are beginning to understand the fundamental processes of aging, bringing the possibility of averting the diseases of old age, and perhaps aging itself.

Assessment and Implications: Biomedicine will be to the twenty-first century what computers were to the twentieth, a force that transforms our lives beyond anything our parents could have conceived. By 2020, medicine will finally understand and be able to control such mysteries as our need for sleep, the cancerous transformation of cells and the spread of tumors to remote parts of the body, Alzheimer's and Parkinson's diseases, and some forms of mental illness. It also will produce drugs to improve memory and concentration and extend our lives to age 110 or more with mid-life health and vigor. What it will offer even far-

ther into the future, we can hardly guess.

In the next 10 years, we expect to see more and better bionic limbs, hearts, and other organs; drugs that prevent disease rather than merely treating symptoms; and body monitors that warn of impending trouble. These all will reduce hospital stays.

Outside the United States, transplants of brain cells, nerve tissue, and stem cells to aid victims of retardation, head trauma, and other neurological disorders will enter clinical use by 2012. Laboratory-grown bone, muscle, and blood cells also will be employed in transplants.

Expect also the first broadly effective treatments for viral diseases, experimental regeneration of lost or damaged human tissues, and effective ways to prevent and correct obesity.

By 2025, the first nanotechnology-based medical therapies should reach clinical use. Microscopic machines will monitor our internal processes, remove cholesterol plaques from artery walls, and destroy cancer cells before they have a chance to form a tumor.

Forecasting International believes that cloning and related methods will be accepted for the treatment of disease, though not to produce identical human beings.

Even without dramatic advances in life extension, baby boomers are likely to live much longer, and in better health, than anyone now expects. However, this trend could be sidetracked by the current epidemic of obesity, which threatens to raise rates of hypertension, diabetes, heart disease, and arthritis among boomers, if a cure is not found quickly enough.

High development and production costs for designer pharmaceuticals, computerized monitors, and artificial organs will continue to push up the cost of health care far more rapidly than the general inflation rate. Much of these expenses will be passed on to Medicare and other third-party payers.

Severe personnel shortages can be expected in high-tech medical specialties, in addition to the continuing deficit of nurses.

A growing movement to remove barriers to stem-cell research in the

United States could speed progress in this critical field. This could be expected to produce new treatments for neurological disorders such as Parkinson's and Alzheimer's disease and many other illnesses now incurable or untreatable. It also would recover one aspect of America's lost lead in science.

A significant extension of healthy, vigorous life—to around 115 or 120 years as a first step—now seems more likely than no extension at all.

42 The Internet continues to grow, but at a slower pace.

- In mid-2009, Internet users numbered about 1.7 billion, up less than 50% in two years.

- Most growth of the Internet population is now taking place outside the United States, which is home to only 13% of the world's Internet users (but who now account for about 74% of the U.S. population). In mid-2009, data showed 162 million Internet users in China (27% of the population), 81 million in India (7%), and 96 million in Japan (75.5%). Internet penetration is lagging badly in Africa, where only 6.8% of the population is online (up from just 3.8% two years earlier). Africa's Internet users are mainly in the North African countries or in the Republic of South Africa. In between, Internet connections are scarce.

- When it comes to percentage of broadband users, the United States ranks only fifteenth among the developed lands and twenty-fourth over all. About 70% of U.S. Internet users have broadband service, compared with 90% in South Korea. Americans also get poorer service, with broadband speed 18th worldwide and some service providers throttling download speeds for heavy users.

- E-commerce is still recovering from a downturn in the third quarter of 2008. In the United States, online sales in the second quarter of 2009 came in at about \$32.4 billion, up 2.2% at a time when total retail sales shrank by 4.4%.

- Not long ago, the Internet was predominately English-speaking. In mid-2007, English and "Chinese" (we assume, but cannot confirm, that

this combines mainland Mandarin, Taiwanese Mandarin, and Cantonese) were tied at 31.7% of Internet users. More than 5% of Netizens spoke Spanish, Japanese, German, or French.

Assessment and Implications: Americans will continue to dominate the Internet so long as they produce a substantial majority of Web pages—but that is not likely to be very long.

Analysts believe that growth of Internet use will not accelerate again until broadband service becomes less expensive and more widely available. This is a matter of government policy as much as of technology or basic costs.

Demands that the United States relinquish control of the Internet to an international body can only gain broader support and grow more emphatic as Americans make up a smaller part of the Internet user population.

The Internet has made it much easier and cheaper to set up a profitable business. An online marketing site can be set up with just a few minutes' work at a cost of much less than \$100. This is fostering a new generation of entrepreneurs.

Internet-based outsourcing of U.S. jobs to other countries has only just begun. Growth in this field will accelerate again as service firms around the world polish their workers' English, French, and German and find even more business functions they can take on.

Cultural, political, and social isolation has become almost impossible for countries interested in economic development. Even China's attempts to filter the Internet and shield its population from outside influences have been undermined by hackers elsewhere, who provide ways to penetrate the barriers.

Management and Institutional Trends

43 More entrepreneurs start new businesses every year.

- In the United States, about 11% of workers are self-employed. Self-em-

ployment has been growing in about two-thirds of the OECD countries.

- Women comprise a growing proportion of the self-employed in the United States, up from about 27% in 1976 to 36% in 2009, according to the BLS.

- Many women are leaving traditional jobs to go home and open businesses, even as they begin a family. At least half of the estimated 10.6 million privately held firms in the United States are owned by women, employing 19.1 million people and generating \$2.46 trillion in sales annually.

- Workers under 30 would prefer to start their own company, rather than advance through the corporate ranks. Some 10% are actively trying to start their own businesses, three times as many as in previous generations.

- Most simply distrust large institutions and believe that jobs cannot provide a secure economic future in a time of rapid technological change.

- Firms with fewer than 500 employees accounted for 64% (or 14.5 million) of the 22.5 million net new jobs (gains minus losses) between 1993 and the third quarter of 2008, according to BLS figures. "While small firms create a majority of the net new jobs, their share of employment remains steady since some firms grow into large firms as they create new jobs," notes the Small Business Administration.

- However, jobs also disappear fastest from small companies, which are much more likely to fail than larger concerns.

Assessment and Implications: This is a self-perpetuating trend, as all those new service firms need other companies to handle chores outside their core business. It will remain with us for many years, not only because it suits new-generation values but because it is a rational response to an age in which jobs can never be counted on to provide a stable long-term income.

It is driven as well by the attitudes and values of Gen X and the millennials and by the rapid developments in technology, which create endless opportunities for new business development.

Specialty boutiques will continue

to spring up on the Internet for at least the next 15 years.

This trend will help to ease the poverty of many developing countries, as it already is doing in India and China.

44 Government regulations will continue to take up a growing portion of the manager's time and effort.

- In 1996, the U.S. Congress passed regulatory reform laws intended to slow the proliferation of government regulations. Nonetheless, by 2001 more than 14,000 new regulations were enacted. Not one proposed regulation was rejected during this period.

- In 2008, the Federal Register, which records regulations proposed and enacted, ran to more than 80,200 pages. To keep up with the flow, it is published daily. It has not missed a day since its first edition in 1936.

- The Brussels bureaucrats of the European Union are churning out regulations at an even faster rate, overlaying a standard regulatory structure on all the national systems of the member countries.

- The growth of regulations is not necessarily all bad. A study by the Congressional Office of Management and Budget estimated that the annual cost of major federal regulations enacted in the decade ending September 2002 (the most recent data we have been able to locate) amounted to between \$38 billion and \$44 billion per year. However, the estimated benefits of those regulations added up to between \$135 billion and \$218 billion annually.

Assessment and Implications: Regulations are necessary, unavoidable, and often beneficial. Yet it is difficult not to see them as a kind of friction that slows both current business and future economic growth.

The proliferation of regulations in the developed world could give a competitive advantage to countries such as India and China, where regulations that impede investment and

capital flow are being stripped away, while health, occupational safety, and environmental codes are still rudimentary or absent.

However, there is a significant penalty for the kind of risk that comes from inadequate regulation. China pays an estimated risk penalty of 6.49% for international borrowing. Per capita GDP, access to capital, foreign direct investment, and other measures of a country's economic health all decline directly with a rising Opacity Index, which is heavily influenced by the lack of effective regulations to guarantee a level playing field for those doing business there.

Nonetheless, lands such as Russia will remain at a competitive disadvantage until they can pass and enforce the regulations needed to ensure a stable, fair business environment.

45 Multinational corporations are uniting the world—and growing more exposed to its risks.

- The continuing fragmentation of the post-Cold War world has reduced the stability of some lands where government formerly could

guarantee a favorable—or at least predictable—business environment. The current unrest in Iraq is one example.

- Multinational corporations that rely on indigenous workers may be hindered by the increasing number of AIDS cases in Africa and around the world. Up to 90% of the population in parts of sub-Saharan Africa reportedly tests positive for HIV in some surveys. Thailand is almost equally stricken, and many other parts of Asia show signs that the AIDS epidemic is spreading among their populations.

- One risk now declining is the threat of sudden, extreme currency fluctuations. In Europe, at least, the adoption of the euro is making for a more stable financial environment.

Assessment and Implications: It is becoming ever more difficult for business to be confident that decisions about plant location, marketing, and other critical issues will continue to appear wise even five years into the future. All long-term plans must include an even greater margin for risk management. This will encourage outsourcing, rather than investment in offshore facilities that could be endangered by sudden



JESUS CONDE / ISTOCKPHOTO

changes in business conditions.

Countries that can demonstrate a significant likelihood of stability and predictable business outcomes will enjoy a strong competitive advantage over neighbors that cannot. Witness the rapid growth of investment in India now that deregulation and privatization have general political support, compared with other Asian lands where conditions are less predictable.

Although Russia has continued to attract Western investment, particularly in its energy industry, the increasingly autocratic governance by the President Dmitry Medvedev and Premier Vladimir Putin, and probably any future successors, could eventually discourage foreign companies from doing business there or require much more favorable terms to justify accepting the associated risks.

46 Consumers increasingly demand social responsibility from companies and each other.

- More than two-thirds of people around the world surveyed by the World Economic Forum say that the current economic crisis is a crisis of values. Similar numbers believe that people do not live the same values in their business as they do in their personal lives. Nearly 40% of respondents identified honesty, integrity, and transparency as the most important values for the global political and business systems.

- While the current recession may have temporarily reduced the significance of “social responsibility” in much consumer spending, companies are continuing to invest in corporate responsibility programs, because they increasingly are being judged on issues such as how they treat the environment.

- Many are changing their business practices as a result. For example, home-improvement retailers Home Depot and Lowe’s have stopped buying wood from countries with endangered forests.

- With 5% of the world’s population and 66% of the lawyers on the planet, American citizens do not hesitate to litigate if their demands are not met. Other countries, such as

India and China, are beginning to see more legal actions on behalf of citizens’ causes.

- In an effort to get ahead of this trend, companies are now trying to make good citizenship part of their brand. Unlike traditional “good works,” this movement aims for profit and long-term corporate success, not just reputation-polishing.

- In addition to traditional performance measures, *Fortune* now ranks its 500 companies according to “how well they conform to socially responsible business practices.”

- A survey of nearly 1,200 companies, 81% of companies—and 98% of large firms—said corporate citizenship is a priority; 84% said that being socially responsible has improved their profits.

Assessment and Implications: This trend is well established in the industrialized world, but only beginning in the developing world. It can be expected to grow more powerful as the no-nonsense, bottom-line-oriented Gen Xers and millennials gain influence.

Government intervention will likely supplant deregulation in the airline industry (in the interest of safety and services), financial services (to control instability and costs), electric utilities (nuclear problems), and the chemical industry (toxic wastes).

As the Internet spreads Western attitudes throughout the world, consumers and environmental activists in other regions will find more ways to use local court systems to promote their goals. Litigation is likely to become a global risk for companies that do not make the environment a priority.

47 On average, institutions are growing more transparent in their operations, and more accountable for their misdeeds.

- Many different forces are promoting this change in various parts of the world.

- In the United States, the wave of business scandals in 2004, the controversy over child abuse within the Catholic Church, and the unwillingness of the Bush administration to accept effective oversight by Congress all have inspired demands for

greater transparency and accountability. Public ire over the bank failures of 2008, and the subsequent bailouts, may yet trigger another round of regulations designed to shed light on secretive corporations.

- China, rated by Kurtzman Group as the most opaque of the major nations, was forced to open many of its records as a precondition for joining the World Trade Organization.

- In India, a country often regarded as one of the world’s most corrupt, the Central Vigilance Commission has opened the country’s banking system to more effective oversight. Lesser “vigilance commissions” now oversee many parts of the Indian economy and government.

- More generally, wars against terrorism, drug trafficking, and money laundering are opening the world’s money conduits to greater scrutiny. They also are opening the operations of nongovernmental organizations that function primarily as charitable and social-service agencies but are linked to terrorism as well.

Assessment and Implications: There are roughly as many reactions against this trend as there are governments, agencies, or individuals with something to hide. Yet, the benefits of transparency are so clear that the general decline of barriers to oversight is likely to continue until societies develop a consensus about how much—or little—secrecy is really necessary.

Countries with high levels of transparency tend to be much more stable than more opaque lands. They also tend to be much more prosperous, in part because they find it easier to attract foreign investment.

Greater transparency reduces the operational effectiveness of the world’s miscreants. It impedes drug traffickers and terrorist organizations, and also dishonest governments and bureaucrats.

48 Institutions are undergoing a bimodal distribution: The big get bigger, the small survive, and the mid-sized are squeezed out.

- Economies of scale enable the largest companies to win out over mid-sized competitors, while “bou-

tique" operations can take advantage of niches too small to be efficiently tapped by larger firms.

- By 2012, there will be only five giant automobile firms. Production and assembly will be centered in Korea, Italy, and Latin America.

- The six largest airlines in the United States today control 65% of the domestic market, leaving roughly one-third to be divided among many smaller carriers. Many of these are no-frills carriers with limited service on a few routes where demand is high or competition is unusually low.

- Where local regulations allow, mergers and acquisitions are an international game. The continuing removal of trade barriers among EU nations will keep this trend active for at least the next decade.

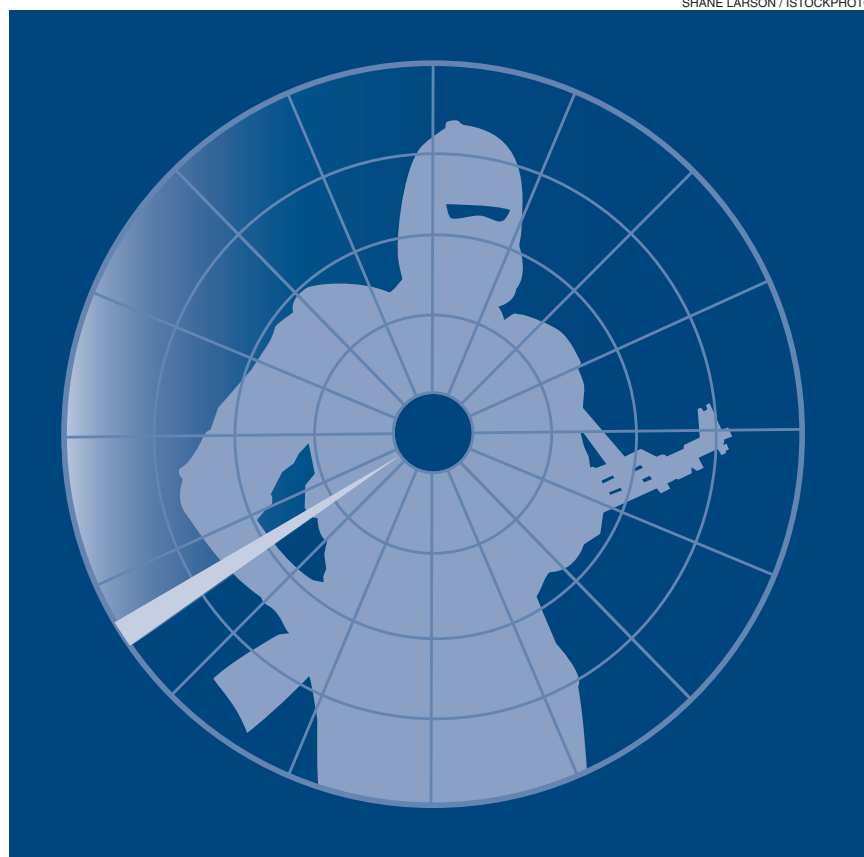
- We are now well into the second decade of micro-segmentation, as more and more highly specialized businesses and entrepreneurs search for narrower niches. These small firms will prosper, even as mid-sized, "plain vanilla" competitors die out. This trend extends to nearly every endeavor, from retail to agriculture.

- "Boutique" businesses that provide entertainment, financial planning, and preventive medical care for aging baby boomers will be among the fastest-growing segments of the U.S. economy.

Assessment and Implications: No company is too large to be a takeover target if it dominates a profitable market or has other features attractive to profit-hungry investors. No niche is too small to attract and support at least one or two boutique operations. Thanks in part to technology, this trend is likely to be a permanent feature of the business scene from now on.

Thus far, industries dominated by small, regional, often family-owned companies have been relatively exempt from the consolidation now transforming many other businesses. Takeovers are likely even in these industries in the next decade.

This consolidation will extend increasingly to Internet-based businesses, where well-financed companies are trying to absorb or out-compete tiny online start-ups,



much as they have done in the brick-and-mortar world.

However, niche markets will continue to encourage the creation of new businesses. In Europe as of 2006, no fewer than 48 small, no-frills airlines in 22 countries had sprung up to capture about 28% of the Continental market share. Only 15 offered more than 50 flights per day.

Terrorism Trends

49 Militant Islam continues to spread and gain power.

- It has been clear for years that the Muslim lands face severe problems with religious extremists dedicated to advancing their political, social, and doctrinal views by any means necessary.

- Most of the Muslim lands are overcrowded and short of resources. Many are poor, save for the oil-rich states of the Middle East. Virtually all have large populations of young men, often unemployed, who are fre-

quently attracted to violent extremist movements.

- Despite this, the number of Muslims who say that suicide bombing is "often/sometimes justified" in a Pew survey has shrunk significantly since its post-9/11 peak. Only 15% of Egyptians supported suicide bombing in 2009, down from 28% in 2006. In Lebanon, only 38% supported it, compared with 74% in 2002.

- During its proxy war with the Soviet Union in Afghanistan, the United States massively fortified the Muslim extremist infrastructure by supplying it with money, arms, and above all training.

- It made a similar mistake in Iraq, where the American occupation inspired a new generation of jihadists, who now are migrating to Afghanistan and Pakistan.

- In a now-declassified National Security Estimate, the U.S. intelligence community concluded that al-Qaeda was more powerful in 2007 than it had been before the so-called "war on terror" began—more dangerous even than it had been when it

planned the attacks of September 11, 2001.

- Afghanistan, Pakistan, and Somalia all face growing Muslim insurgencies.

Assessment and Implications: Virtually all of the Muslim lands face an uncertain, and possibly bleak, future of political instability and growing violence. The exceptions are the oil states, where money can still buy relative peace, at least for now.

These problems often have spilled over into the rest of the world. They will do so again. The West, and particularly the United States, must expect more—and more violent—acts of terrorism for at least the next 20 years.

Europe faces a significant home-grown Muslim extremist movement, and the United States may do so in the near future. Thanks largely to waves of immigration since the 1980s, Islam is the fastest-growing religion in both regions. Extremist clerics in Europe are recruiting young Muslims to the cause of jihad against their adopted homes. So far, their colleagues in the United States have been much less successful. That may not always be true.

Muslims living in Great Britain have recently launched a grassroots peace campaign (www.LoveForAllHatedForNone.org) to counter extremist views and to promote a positive image of Islam. The campaign comes at a time when Islamophobia is at a height. A recent survey by an independent agency had found that a quarter of respondents had described Islam as the “worst religion” on earth, the group reports.

In a 1994 terrorism study for the Department of Defense and other government clients, Forecasting International predicted that by 2020 a majority of the world’s 25 or so most important Muslim lands could be in the hands of extremist religious governments. At the time, only Iran was ruled by such a regime. That forecast still appears sound.

Iraq is likely to become the next fundamentalist Muslim regime. Once U.S. forces leave, Iran will support the establishment of a Shiite regime much like its own in Baghdad.

There is a one-in-ten chance that this will set off a general war in the

Middle East, as Sunni-dominated states intercede to protect Iraqi Sunnis against Shi’a domination. However, Iraq and Saudi Arabia already are negotiating to keep this situation under control.

Any attempt to reduce the commitment of Western forces to the task of stabilizing Afghanistan will result in the restoration of the Taliban to power.

50 International exposure includes a greater risk of terrorist attack.

- State-sponsored terrorism has nearly vanished, as tougher sanctions made it more trouble than it was worth. However, some rogue states may still provide logistical or technological support for independent terrorist organizations when opportunities present themselves.

- Nothing will prevent small, local political organizations and special-interest groups from using terror to promote their causes. These organizations have found inspiration, and many have found common cause, in the successes of al-Qaeda.

- Until recently, attacks on U.S. companies were limited to rock-throwing at the local McDonald’s, occasional bombings of bank branches and of U.S.-owned pipelines in South America, and kidnappings. Since September 11, U.S.-owned hotel chains have experienced major bombings, in part because U.S. government facilities overseas have been effectively hardened against terrorist assault.

- As the United States has been forced to recognize, the most dangerous terrorist groups are no longer motivated primarily by specific political goals, but by generalized, virulent hatred based on religion and culture.

- Terrorism has continued to grow around the world as the Iraq war proceeds, even as the rate of violence in Iraq itself has, at least temporarily, declined.

- Risks of terrorism are greatest in countries with repressive governments and large numbers of unemployed young men.

Assessment and Implications: On balance, the amount of terrorist ac-

tivity in the world will continue to rise in the next 10 years. Terrorism against the West is likely to grow, not decline, when fighters trained and bloodied in the Iraq war are able to turn their attention elsewhere.

Western corporations may have to devote more of their resources to self-defense, while accepting smaller-than-expected profits from operations in the developing countries.

Like the attacks on the World Trade Center and Pentagon, the U.S. embassies in Kenya and Tanzania before them, and the bombings of the Madrid rail system and London subways since then, any attacks on major corporate facilities will be designed for maximum destruction and casualties. Bloodshed for its own sake has become a characteristic of modern terrorism.

Where terrorism is most common, countries will find it difficult to attract foreign investment, no matter how attractive their resources.

Though Islamic terrorists form only a tiny part of the Muslim community, they have a large potential for disruption throughout the region from Turkey to the Philippines.

The economies of the industrialized nations could be thrown into recession at any time by another terrorist event on the scale of 9/11. This is particularly true of the United States. The impact would be greatest if the incident discouraged travel, as the 9/11 attacks did.

51 As technology grows more complex, the world is growing more fragile.

- Vulnerabilities do not grow with the size of a system, but in proportion to the number of its interconnections. Thanks to the Internet, much of the world is almost infinitely interconnected.

- Anyone with a personal computer knows how often operating systems, programs, and hardware break down owing to unforeseen interactions between one part of the programming and another.

- Unforeseen, and often unforeseeable, drug interactions abound in older patients, who may be taking one medication to control their blood sugar levels, two or three drugs to

keep their cholesterol and blood pressure under control, something for their arthritis, and half a dozen over-the-counter pharmaceuticals and supplements. One physician we know is also a PhD pharmacologist. He declares: "If a patient is taking more than three drugs, even if they aren't supposed to interact, you don't have any idea what is going on."

- Early in October 2009, a breakdown in Britain's air traffic control system grounded transatlantic flights at Gatwick and Heathrow, in London. In mid-November, a breakdown in critical computer systems in Salt Lake City and Atlanta sent air traffic controllers back to entering information into their computers manually. Flights were delayed for hours.

- Counterterrorism experts tell us that most of the electrical power west of the Mississippi could be taken off-line for months if terrorists destroyed just four critical lines in the right sequence, with proper timing. Again, this is a result of the ways in which some components of a complex system interact with the rest.

Assessment and Implications: Nothing will stop the world's technological systems from becoming more complex every day.

Spontaneous breakdowns in critical systems will grow more common with each passing year. Picture a malfunction in the systems controlling traffic on an automated highway or the pilotless airliners proposed for 2030.

Opportunities for sabotage also will proliferate.

Operators of mundane systems, such as sewage plant controls or fire alarm monitors, may find they need to implement quality assurance protocols as complex as the ones NASA developed for the space program.

System security is likely to be a high-growth field for well-trained specialists in the coming decades.

52 Cyberattacks are spreading rapidly.

- In the run-up to Russia's battle with Estonia in May 2007, a massive denial-of-service attack brought most of the Estonian economy to a halt. The incident has never been proved

to have originated with the Russian government.

- A similar attack struck computers in Georgia when relations with Russia became uncommonly tense.

- Canadian researchers reported that they had uncovered more than 1,000 attacks on sensitive computer systems carried out by hackers working through Chinese servers. Targets included embassies and consulates, academic networks, and the office of the Dalai Lama.

- U.S. security officials reported discovery of illicit software buried in computers that control the nation's electrical grid. The routines, which authorities said must have been installed by one or more foreign governments, would have allowed hackers to shut down the power system in time of emergency.

- Cyber-gangs in eastern Europe have been attacking small and mid-sized companies in the United States, transferring funds from out of the target accounts. Victims who have come forward include an electronics testing firm in Baton Rouge, Louisiana, that was robbed of nearly \$100,000; a Pittsburgh-area school district that lost \$700,000; and a Texas company that was defrauded of \$1.2 million.

- In 2007, government computer-security specialists discovered that someone had broken into networks operated by the departments of Defense, State, and Commerce, and probably NASA and the Department of Energy—"all the high-tech agencies, all the military agencies," as Jim Lewis, director of the Center for Strategic and International Studies, put it. The intruders downloaded a mass of sensitive information roughly equivalent to the contents of the Library of Congress.

- Several major power outages in Brazil—in 2005, 2007, and 2009—have been blamed on computer hackers who sabotaged the electric company's control systems.

- In November 2009, cybersecurity officials from the U.S. Strategic Command reported that the number of malicious attempts to break into Defense Department computer networks had jumped by 60% from the previous year, to 43,785 in the first six months of 2009.

- Cyberterrorism specialists worry that computer chips bought from foreign sources could include extra circuitry that would give hackers a "back door" into supposedly secure computer systems. The chips could be used to download secret data or shut down critical hardware in time of war. At least one such attack is believed to have been successful.

Assessment and Implications: Cyberattack is a simple, low-cost, deniable way to give an adversary grief during peacetime as well as in war. It will be a favorite tool for anyone with the skill to use it.

The United States is not prepared to safeguard itself against cyber-attack by a foreign power.

Neither is any other country whose classified or sensitive computer networks are connected to the Internet.

Classified information on an Internet-connected computer systems should be regarded as already compromised.

Although there is no evidence that international terrorist organizations have yet adopted cyberwarfare to further their goals, they will do so as soon as they gain the necessary skills. At that point, real-world destruction by cyberwarfare will become a significant threat. Possible attacks include hacking into air traffic control systems, chemical plant and refinery controls, power systems, and other critical and potentially lethal infrastructure.

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